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Original Communications

THE RELATION OF ECTOPIC GESTATION TO THE ASSOCIATED UTERINE CHANGES AND VAGINAL BLEEDING*

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SAMPSON¹ in 1914 pointed out the influence exerted by ectopic pregnancy on the uterus, especially its effect on the uterine blood supply, and its relation to uterine bleeding. He studied a series of cases of ectopic pregnancy in which the uterus had been operatively removed and concluded that the termination of ectopic pregnancy rarely is complete at the time the patient is operated upon. He thought that as long as it is incomplete, pain and bleeding continue, the incompleteness of the ectopic gravidity causing a subinvolution of the uterus similar to that due to an incomplete intrauterine abortion. The uterine bleeding, he demonstrated by his injection method, to be venous in origin and to arise from the endometrium. He did not believe that there was any escape of blood from the tube into the uterine cavity. Venous spaces, especially in the compacta at its junction with the spongy layer, are commonly thrombosed or ruptured and it is at this level that the separation which gives rise to the decidual cast takes place. Occasionally superficial venous spaces may rupture and cause subepithelial extravasations of blood which break through the mucosa into the uterine cavity. When this type of lesion predominates, no decidual cast is expelled. Sometimes the entire compact layer is destroyed in small fragments. The uterine mucosa as the end-result of this regressive and destructive stage is a thin endome-

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NOTE: The Editor accepts no responsibility for the views and statements of authors as published in their "Original Communications."

trium with few glands and a surface covered by cuboidal epithelium. This is the type of mucosa so commonly obtained by curettage in cases that have been bleeding for a long period. Sampson also believed that as long as active villi are present this subinvolution persists.

Polak and Welton² also made a study of the changes in the uterus associated with ectopic gravidity. They believed that the pain was due to tubal and uterine contractions which resulted in a separation of the uterine and tubal decidua. The clinical evidence of these contractions is bleeding from the endometrium and extrusion of portions of the decidua. As long as the embryo remains alive and its development is in progress, uterine bleeding does not occur. When it does occur following the destruction of the embryo, it may continue for a considerable period of time, due to the fact that the chorionic villi remain alive and exert an influence on the uterus. They mention the possibility of blood escaping through the uterine end of the tubes into the uterus when the pregnancy is close to the horn. They also believe that 50 per cent of the cases pass a decidual cast either "en masse" or piecemeal.

In the tube, decidual reaction was found often far remote from the seat of implantation. Coincident with the separation of the ovum, there may be bleeding from these decidual areas in the tubes as well as in the uterus.

Polak and Wolfe³ investigated the persistence of vaginal bleeding following the removal of the gestation sac. In twenty cases, post-operative uterine bleeding persisted for periods varying from a week to fifteen days following the removal of the tube. In five of these cases the uterine cavity was subsequently curetted. They concluded from the study of these curettings that the persistent bleeding is due to the fact that in the uterus, islands of decidua remain which are cast off at subsequent times, this desquamation being associated with hemorrhage. In some few cases where the bleeding persisted, no decidua was found, only a hemorrhagic interval mucosa. The persistence of bleeding in these cases they ascribed to a delayed involution. Polak, Novak and Wolfe quote cases in which a curettage revealed decidua but in which, with the continuance of the extrauterine gravidity, a new decidua was formed.

Novak and Darner⁴ studied twenty-one cases of tubal pregnancy in which uterine mucosa was available. They believe that uterine casts are expelled in about 50 per cent of the cases of tubal pregnancy and feel that in not a few cases, intrauterine degenerative changes may cause a disintegration of the mucosa so that it may be expelled in small particles and thus escape detection. They believe that the thrombosis in the sinuses at the junction of the compacta and spongiosa brings about the separation of the superficial layer. They con-

clude that the life of the uterine decidua is closely associated with the viability of the impregnated ovum and that as long as the embryo is alive, the decidua remains intact. With the death of the embryo begins the degenerative change. They point out that even though the fetal death is responsible for the separation of decidua, the sequence is not always an immediate one. The presence of trophoblastic activity after the death of the fetus would help to explain the persistence of bleeding in many cases of extrauterine pregnancy. Novak emphasizes that curettage done for diagnostic purposes is usually performed because of the persistent bleeding and that the most common finding at this period is a postmenstrual or interval type of mucosa. He concludes that little information can be obtained by this procedure. In 21 of his cases, 11 showed postmenstrual or interval type of mucosa. In 7 there was a definite decidua but in these 7 cases, amenorrhea had been present and so curettage as a purely diagnostic measure would have been contraindicated.

Lewers⁵ mentions that persistent amenorrhea is especially characteristic of the cornual type of extrauterine pregnancy. While many cases of ectopic pregnancy which progress to term are associated with amenorrhea, there are many reported in which bleeding was noted sometime in the course of the pregnancy.

Beaucamp⁶ reports a case of secondary abdominal pregnancy going to term with a living fetus in which there had been bleeding at various times during the course of the gravidity, and mentions similar cases reported in the literature.

Summarizing the literature above quoted, these facts seem to be commonly accepted:

1. That vaginal bleeding is uterine in origin, is of venous character and takes place with the death of the fetus.
2. That bleeding may continue for a considerable period of time, possibly due to the presence of viable chorionic villi in the tube.
3. That following the death of the fetus, the decidua is expelled as a cast, or in small fragments after the lapse of a variable interval.
4. In a considerable percentage of cases, believed by some authorities to be as high as 50 per cent, a decidual cast is expelled either as a large fragment or in disintegrated pieces.
5. That curettage gives little information because when done for prolonged bleeding, as is commonly the indication, the mucous membrane is of a resting type.
6. There is, however, evidence that in spite of bleeding during extrauterine gravidity, the pregnancy may develop to term with a living baby. This fact would indicate that uterine bleeding may occur without producing death of the fetus.

We desire to report 39 cases in which laparotomy was performed,

and where the character of the endometrium could be determined. In this group there were 6 hysterectomies, 5 of which were performed because of coincidental chronic inflammatory disease. The sixth case was one of secondary abdominal pregnancy. The uterine mucosae in the other 33 cases were made available by obtaining 8 uterine casts, 23 curettages, 1 abdominal hysterotomy and 1 uterus at autopsy. The curettages were either performed from twenty-four to forty-eight hours before laparotomy or at various periods subsequent thereto.

The purpose of the investigation was to correlate the findings in the tube and uterus with the clinical symptoms, especially with vaginal bleeding, and thus to substantiate the findings of previous writers as to the cause and origin of bleeding in ectopic pregnancy.

It is well established that a gravidity, whether intra- or extra-uterine, stimulates a typical decidual reaction in the uterus. When the pregnancy occurs outside the uterus, the decidua that is formed at the site of implantation is usually less marked and less extensive than that responding to the influence of intrauterine gravidity. Study of the decidual formation in the tube in cases of tubal pregnancy has shown that the reaction is inconstant in its occurrence and when present it is usually patchy in its distribution.

It is generally believed that the disturbance of the integrity of an ectopic pregnancy induces changes in the uterus which cause degeneration and casting off of a decidua with accompanying bleeding. These disturbances may be:

1. The disappearance of the chorionic villi with no evidence of fetus in the tube.
2. A living fetus or a recently dead one, with viable chorionic villi.
3. Gradations between these two extremes.

An analysis of our 39 cases is shown in Tables I, II, and III, bearing in mind the purpose of the investigations; namely, the association of bleeding with the persistence of decidual tissue in the uterus, and the existence of the living fetus and of living chorionic tissue.

CASES SHOWING SPOTTING AND UTERINE DECIDUA

In our series of 39 cases, 23 showed uterine decidua, a larger portion than those previously reported. Eight of the 39 cases, nearly 20 per cent, passed decidual casts that were easily recognizable. What percentage would have passed casts, if they had not been curetted or had not had hysterectomies performed, or if they had been more observant as to the vaginal discharge, cannot be determined.

The question naturally arises as to whether this decidua disappears immediately with the death of the pregnancy in the tube or if it does persist, for how long does it survive and what causes it to survive? It is generally believed that disturbances of the tubal pregnancy in-

duce changes in the uterus which result in degeneration and casting off of the decidua with accompanying vaginal bleeding. This disturbance may be complete death of the ovum (both fetus and chorionic villi), a damaged fetus with viable chorion or any gradations between those two extremes. The variations between these two extremes may

TABLE I. NO EXTERNAL BLEEDING. 3 CASES

CASE NO.	TUBAL FINDINGS		UTERINE FINDINGS	
XIX	Ruptured	Degenerated villi Langhans cells	Definite decidua	
XXX	Ruptured	Viable villi	"	"
XXXVI	3 months embryo Ruptured		"	"

be the explanation of the variability of the findings in the uterus and tubes. It has been shown that long after the apparent death of the ovum, the chorionic epithelium may continue to survive.

Of 16 cases of typical tubal rupture, 11 showed true decidua in the

TABLE II. SPOTTING. 10 CASES

CASE NO.	TUBAL FINDINGS		UTERINE FINDINGS
IX	Spotted for one day, then one week later again spotted for one day	Well preserved syncytium	Decidua
XI	Spotted for two weeks	Few old degenerated chorionic villi and decidua	Decidua
XIII	Spotted for 6 weeks	Fetus and decidua	Decidua
XXII	Spotted for 4 weeks	10 weeks fetus in tube	Decidual cast expelled two days after operation
XXVI	Spotted for 18 days	Synectium and tubal decidua	No decidua. Resting glands
XXV	Slight bleeding from vagina after examination by doctor 5 days ago. Spotted 3 days ago; first pain 5 days ago and again day of admission	Well preserved Langhans and synectial cells	Decidua and pregnancy glands
XXXI	Spotted for 3 days, 1½ month before final attack of pain indicated rupture	Fetal sac. Viable villi	Cast expelled 3 days after operation
II	Spotted for 2 weeks before admission	Secondary abdominal pregnancy. Fetus living	Decidua and pregnancy glands
XXIII	Spotted for one week, one week ago	Mass synectial cells	Three months size. Typical decidua and pregnancy glands
XXXVIII	Spotted for 10 days	Chorion and decidua	Decidua

TABLE III. BLEEDING, EXTERNAL. 26 CASES

CASE NO.		TUBAL FINDINGS	UTERINE FINDINGS
I	Spotted for 1 week, then bled for 2½ weeks. Total 3½ weeks	Well preserved chorion decidua	Negative
III	Spotted 1 month with periods of 2 to 3 days of actual bleeding	Degenerated chorion and some syncytial cells	Negative
IV	Spotted for 8 days and bleeding 2 weeks	Well preserved syncytium. No decidua	Negative
V	Bled for 2 weeks	Degenerated chorionic villi. No decidua	Negative
VI	Bled profusely for 2 weeks	Perfect 8 weeks fetus	Negative
VII	Spotted 6 days. Profuse bleeding with clots for 3 days	Few degenerated chorionic villi	Negative
X	Bled for 6 days	Degenerated chorionic villi	Negative
XVIII	Irregular bleeding for 3 weeks	Degenerated chorionic villi and decidua	Negative
VIII	Bled profusely for 7 days	Few necrotic chorionic villi	Edema and changes suggesting old decidua. Glands, some gravidity type
XII	Bled for 12 days. Discharged fragments of tissue	Few syncytial giant cells	Necrotic decidua. No pregnancy glands
XIV	Bled moderately for 4 weeks. Expelled some clots	Viable chorionic villi and decidua	Typical decidua and pregnancy glands
XV	Bled since night before laparotomy (4 days ago)	Well preserved chorionic tissue	Typical decidua and pregnancy glands
XVI	Bled profusely for 2 weeks	Degenerated chorionic villi and decidua	Typical decidua cast expelled 3 days after operation
XVII	Bled for 2 weeks. Expelled large number of clots	Not examined. Reported ruptured	Decidua and pregnancy glands
XX	Bled for 2 weeks	Well preserved islands of Langhans cells	Cast expelled one day before operation
XXI	Bled for 6 weeks	Necrotic chorionic villi and decidua	Negative
XXIV	Bled for 3 weeks	Degenerated chorion	Typical cast expelled 25 days before laparotomy
XXVII	Bled profusely for one month	Degenerated chorion	Negative

TABLE III.—CONT'D

CASE NO.		TUBAL FINDINGS	UTERINE FINDINGS
XXVIII	Bled for 2 weeks	Well preserved syncytial and Langhans cells	Negative
XXIX	Spotted for 10 days, then profuse bleeding for 5 days	Degenerated chorionic villi	Typical decidua and pregnancy glands
XXXII	Bled for 5 weeks	Well preserved Langhans cells	Negative
XXXIII	Bled irregularly one week	Synectial masses in vessel walls	Cast expelled the day of operation
XXIV	Bled for 3 weeks	Reported ruptured; not examined	Typical decidua and pregnancy glands
XXXV	Bled for 24 days	Necrotic villi	Negative
XXXVII	Bleeding period not determined	Many degenerated chorionic villi, many well preserved villi	Negative
XXXIX	Bleeding 3 weeks	Degenerated villi; some well preserved	Negative

SUMMARY

3 Cases	No bleeding at all	3 definite decidua in uterus
10 Cases	Spotting	9 definite decidua in uterus
26 Cases	Bleeding	15 showed no decidua or pregnancy glands in uterus
		11 showed decidua and pregnancy glands in uterus

uterus. Of these 11 cases, 2 presented no external bleeding. In 1 of the 2 cases, a living three months' embryo was found, while in the second, no embryo but some viable chorionic villi were present. Of the 11 cases, 7 gave a history of spotting of from one to forty-eight days (Figs. 1 and 2), and of these 7 cases, 2 presented a living eight weeks' fetus. In another case where the spotting was of forty-eight days' duration, the tubes and clots showed no evidence of fetus or villi but masses of syncytium. In the other 4 cases no fetus was found but viable villi were present.

Of the 15 cases of tubal abortion, 4 showed definite intrauterine decidua and one an atypical decidua. In the cornual pregnancy there was likewise a typical decidua. In another case in which the actual condition of the tubes was not described other than as an ectopic pregnancy, there was atypical decidua.

Apparently the bleeding does not necessitate the expulsion of a cast nor does death of the fetus entirely control this. In those instances where no fetus was found, viable villi were always present



Fig. 1.—Showing typical decidua and glands of pregnancy in a case of tubal rupture. History of spotting for one week.

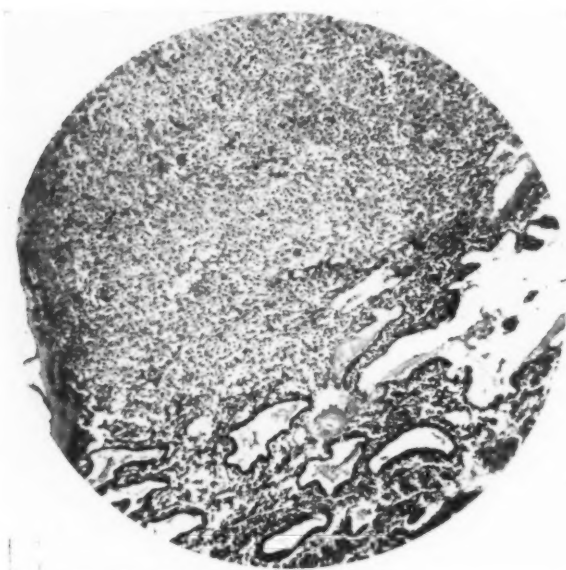


Fig. 2.—Typical decidua in a case of tubal rupture with a history of three weeks spotting. Tissue obtained at the end of three weeks by curettage.

with the exception of one case and in that instance if more material had been available we would probably have been able to find living chorionic tissue.

In the cornual pregnancy, there was typical decidua with a history

of forty days of bleeding, where only villi were found but no fetus. In one instance of abdominal pregnancy, typical decidua was found. There was a history of spotting for four and one-half months and a viable pregnancy in the abdomen.

DECIDUAL CASTS

In 8 instances uterine decidual casts were expelled. Of these 8, 5 occurred in 16 cases of tubal rupture (Fig. 3); 3 in 15 cases of tubal abortion (Fig. 4).

In one instance where a typical cast had been expelled, a curettage done a few days later showed a new formed typical decidua. The

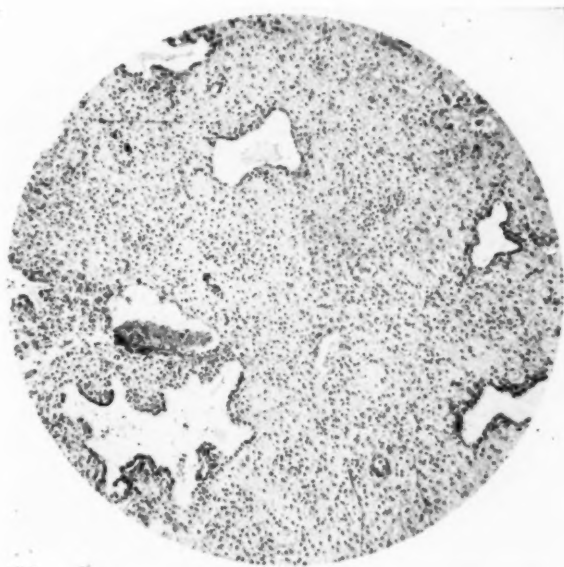


Fig. 3.—Typical decidual cast in a case of tubal rupture. Cast expelled three days postoperatively with no previous bleeding.

tube presented only a few viable villi. Of course, this may have been old decidua that had persisted after the cast was expelled. In three instances a cast was expelled postoperatively, in one instance, seventeen days after the onset of symptoms, the day of operation. In all but one case, bleeding was a premonitory symptom, and in 3 cases viable villi only were found in the tube. In the fourth case a fetal sac was found but no evidence of a fetus.

Three casts were obtained in 15 cases of tubal abortions, 1, one day postoperatively (typical cast), with a bleeding history of four weeks. The tube in this case showing viable villi. In the third case the cast was obtained fifteen days after the bleeding began. This bleeding lasted thirty-four days, which was up to the day of operation. Only

syncytium and Langhans cells and a few viable villi were found. In one unruptured case a typical cast was obtained two days postoperatively. There was a history of spotting for two and one-half months and at operation a placenta, which was eroding the wall, was found in the tube.

RESTING MUCOSAL STAGE

In 12 cases of tubal abortion, 7 showed interval mucosa, and in 6 instances degenerated villi were found in the tube and in the seventh a degenerated ovum (Figs. 7 and 8). In one case a premenstrual endometrium was found. All of these cases gave a history of bleeding

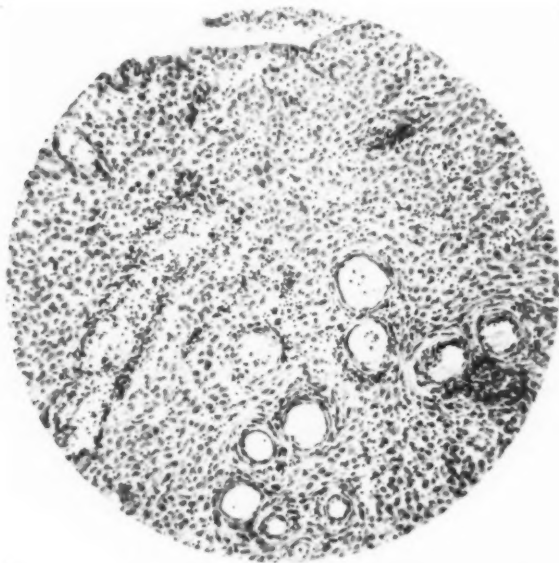


Fig. 4.—Typical decidual cast in a case of tubal abortion. Spotting for two months beginning two and one-half months after last regular period. Operation showed a viable fetus in the abdominal cavity.

from three to five weeks. In 3 of 4 unruptured cases, there was resting mucosa. In 2 of these, viable villi were found only in the tube, and in one, an eight weeks' fetus. In this latter case there had been previous bleeding for two weeks and in the other two cases, for three weeks.

TUBAL DECIDUA

Tubal decidua is much more difficult to find and is much less extensive in its distribution than uterine. In five cases of tubal abortion, more or less marked decidua was found in the tube (Fig. 5). In three instances there was no decidua in the uterus.

In the group of ruptured pregnancies, four cases showed decidua present in the tube (Fig. 6). In all but one there was a decidual

reaction in the uterus, and in all these cases viable villi were found in the tube. Apparently there is no definite relationship between the occurrence of uterine decidua and tubal decidua. Of course, in the uterus the decidua may be easily cast off, while in the tube it will persist for a long period of time before complete involution takes place so that it would not be at all unusual to find decidual reaction in the tube when none is present in the uterus. It also seems likely that decidua is much more common in the tube than has been hitherto believed and that study of sufficient material may demonstrate this. It is true that the tubal decidual reaction is not as extensive as that found in the uterus but that it occurs in small, widely separated

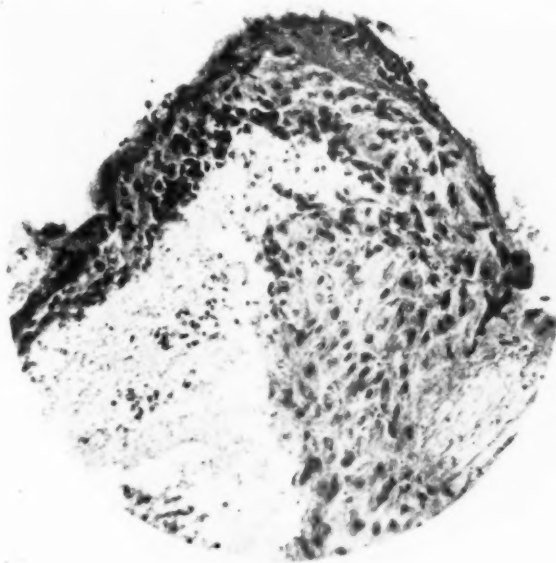


FIG. 5—Tubal decidua in a case of tubal rupture. This case had a curettage which showed typical decidua. Six days later abdominal section, three months viable fetus found in the abdomen. Tubal rupture; no bleeding from uterus since original curettage. Uterus obtained at autopsy showed decidual tissue.

patches. In our search we rarely found it on the surface or directly in the subepithelial connective tissue. It was most often present in the connective tissue septa of the villi in the neighborhood of the blood vessels, and undoubtedly persisted for a much longer period of time because the involutionary process in the tube at this depth is decidedly slower than in the uterus.

It is obvious that the histories show marked variation and that consequently a definite correlation between the presence of decidual reaction in the uterus, a history of bleeding and the tubal findings encountered, is extremely difficult. It is evident, however, that when there is no history of bleeding a typical decidua is present in the

uterus. On the other hand, even in spite of a long history of bleeding and in the absence of a viable fetus, uterine decidua may be found. In one instance as will be recalled, in spite of the fact that no fetus was found and that a typical cast was expelled, a subsequent curettage showed a definite uterine decidua.

The uterine lining may be cast off in fragments too small to be recognized. In the other instances the fragments are of sufficient size to be identified as uterine casts. The mechanism must be different in the two types of involution. As has been suggested by previous writers, thrombosis of the veins in the lower portion of the decidua causes separation of the entire uterine lining and due to the subse-

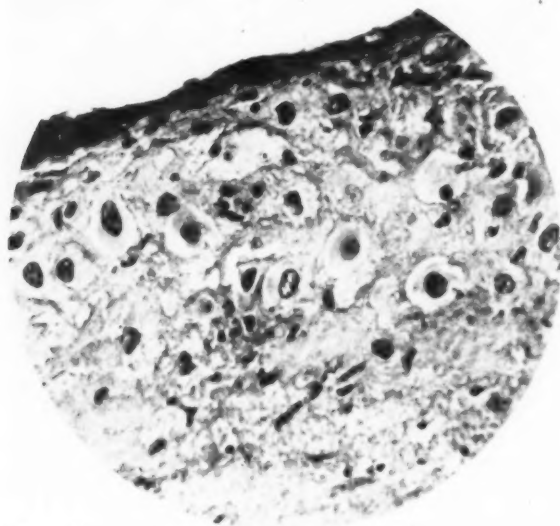


Fig. 6.—Tubal decidua in a case of tubal abortion. Uterus removed for coincidental bilateral tubal disease. Resting mucosa with a few tortuous glands and edematous compact layer. Forty day history of bleeding. Note intact surface layer. Tube showed degenerated and viable villi and syncytial cells.

quent uterine contractions, this tissue is expelled either in one large piece or in several pieces. The second type of involution possibly is due to the thrombosis of the vessels in the compact layer with necrosis and expulsion of smaller fragments which are unrecognizable in discharge.

Analysis of our cases shows a striking lack of regularity between symptoms and findings. In some instances with a long history of bleeding, decidua was found in the uterus, while in others with similar histories, no decidua was found. In some instances where viable villi were present, decidua was found in the uterus and not in others. Therefore the duration of the bleeding does not give a clue to the condition

of the uterus. The presence or absence of a fetus does not necessarily determine the reaction of the uterine mucosa. In many instances chorionic villi are found, some degenerated and some preserved, with the mucosa varying from the typical decidua to the typical interval. One factor seems to stand out, and this has been emphasized by Sampson and Novak, if there is no external bleeding one may expect to find a decidual reaction in the uterus. What the hormonal action is that causes and maintains the decidual type of mucosa, we cannot definitely state. It is also interesting to note that in the cases of tubal rupture, we encountered decidua in the uterus three times as frequently as in tubal abortion. It is worthy of em-

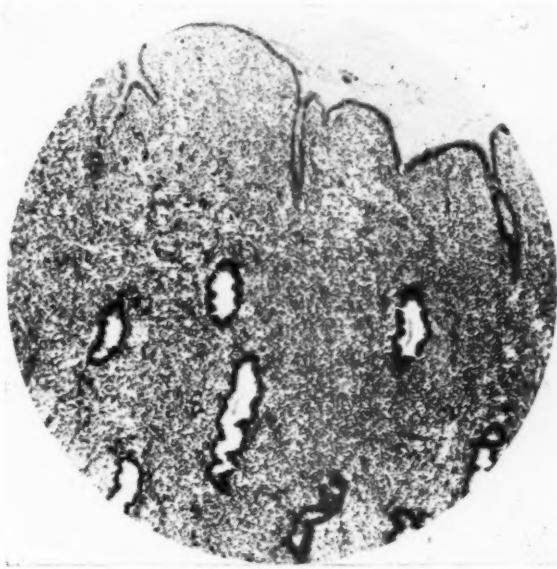


Fig. 7.—Resting mucosa. Tubal abortion. Bleeding six weeks; obtained by curettage. Laparotomy nine days later; still bleeding.

phasis that a viable fetus is more frequently found and that well-preserved villi are much more abundant in the ruptured pregnancy than in tubal abortion. Again a rather unusual circumstance was demonstrated by the investigation, i.e., that in spite of a long history of spotting and in some instances of profuse external bleeding for as long as fourteen to forty-eight days, a viable fetus was found despite this external evidence ordinarily considered as indicating the death of the fetus. In many instances, however, we found as did Novak and Sampson, that the fetus had disappeared and only chorionic villi were present.

The study of the casts obtained presented an interesting problem. They were usually expelled in one large piece or in several fair-sized

pieces, the usual time being seventy-two hours after operation. The expulsion of these casts was preceded by bleeding for from fourteen to forty-two days, while in one case there had been spotting for two months before the expulsion of the cast.

Where the death of the fetus and of the chorionic villi is incomplete and chorionic tissue continues to grow, even though most of the decidua has been expelled, the formation of a new decidua may be stimulated as evidenced by the interesting case quoted in the earlier part of the paper, where, following curettage, a new decidua developed. The question naturally presents itself whether or not the relative proportion of living chorionic tissue is not the deciding factor in the persistence of decidual reaction in the uterus.

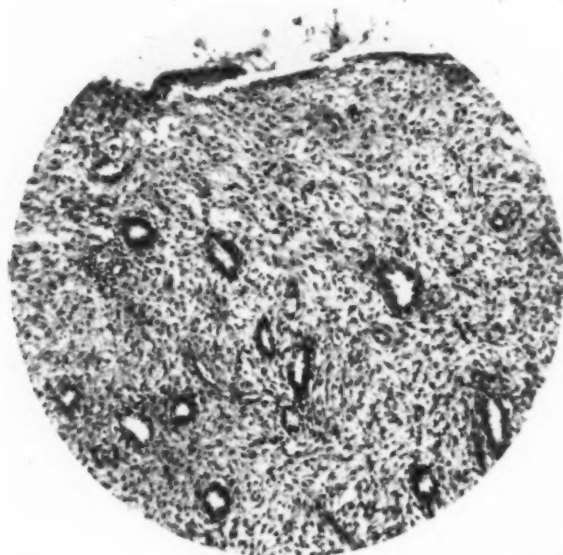


Fig. 8.—Tissue showed typical resting mucosa with edematous stroma somewhat simulating decidua cells in a case of tubal rupture. History of prolonged bleeding. The tube showed chorionic villi and also decidua.

One rather unusual but interesting point must be made and that is the occurrence of external bleeding due to true trauma. We have had two cases where the patients thinking themselves pregnant have directly introduced some foreign body into the uterus which has caused external bleeding. Novak, too, had a similar case. This must always be thought of in weighing the clinical evidence before the diagnosis is made.

From an analysis of our findings we conclude the occurrence of bleeding in ectopic gestations may be attributed to a variety of causes:

1. Mechanical interference. Analogous to the number of normal pregnancies which are terminated by abortions, there are patients with

ectopic pregnancies who, thinking themselves normally pregnant, cause vaginal bleeding by methods to induce abortion.

2. There are many normal intrauterine pregnancies in which bleeding or spotting occurs especially in the early months and which nevertheless progress to term. Some of the bleeding in the ectopic may be of this nature.

3. We consider spotting a symptom of far less import than bleeding as an indication of ovular damage (see analysis of cases). Of 10 cases giving a history of spotting, 7 had decidua in the uterus, 1 no decidua, 2 expelled casts. The spotting in these cases was probably caused by uterine contractions initiated by efforts of tube to expel its contents. We would say that the spotting was evidence of tubal and uterine contraction but not of ovular death.

4. Bleeding, we feel, however, accompanies or precedes the casting off of the decidua and is initiated by actual death of chorionic tissue. This casting off of decidua may be in toto or gradual.

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THE EARLY DIAGNOSIS AND PREVENTION OF CARCINOMA OF THE CERVIX*

A CLINICAL PATHOLOGIC STUDY OF BORDERLINE CASES TREATED AT THE
FREE HOSPITAL FOR WOMEN

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IT IS generally agreed that the actual cause of carcinoma is not known, but that chronic irritation is an important exciting factor. This is exemplified in cancer of the cervix as clearly as in any organ of the body. It has been shown that cancer of the cervix is preceded by pregnancy in at least 90 per cent of cases. This figure is true of the series at the Free Hospital for Women reported by Graves.¹ Cullen² found it true in 90 per cent, Williams³ in 96 per cent, and Sampson⁴ in 97 per cent. In the other cases a history of inflammation, congenital erosion, gynatresia or some instrumentation, such as a dilatation, can usually be obtained. Cervicitis and erosion are prone to follow lacerations from childbearing, and the former may follow any instrumentation of the cervix. We agree with Lynch⁵ and others that

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the important etiologic factor is not the laceration but rather the consequent inflammation and chronic irritation.

The changes that occur in the epithelium of the cervix during the active and healing process of cervicitis must be kept clearly in mind. The normal cervical canal is lined with racemose mucous glands that lie deeply embedded in muscle and connective tissue. The epithelium lining the glands, their ducts, and the cervical canal itself is of the single-layered, cylindrical type. This epithelium extends down to the external os where it meets the squamous epithelium of the vaginal portion of the cervix. The latter is covered with a true epidermis consisting of a basal layer on which lie many layers of cells, varying from the round to the spinal type as the surface is reached. The point of junction of the two epithelia varies to some extent. Theoretically, it is at the external os. Practically, the cylindrical epithelium may extend to the outside of the cervix or the squamous epithelium may extend up into the canal to a greater or less extent, the point of junction being correspondingly placed. In the former case glands are found on the outside of the cervix and are prone to become infected.

When cervicitis occurs, the mucopurulent discharge from the glands macerates the squamous epithelium, leaving a denuded surface with scattered islands of more resistant epithelium. This stage of the process is called an erosion. The cylindrical epithelium, being less susceptible to these conditions, grows down over the raw area without changing its macroscopic characteristics. It is red and rough in appearance and bleeds easily. This stage is called pseudoerosion. If the inflammation is especially severe, even the cylindrical epithelium cannot grow. As the inflammation subsides, which it may do spontaneously, there is less discharge. The cylindrical epithelium that has covered the raw surface, no longer bathed with mucus, loses its vitality, while the squamous epithelium regains its vigor. Therefore, the squamous epithelium grows back to its normal position on the outside of the cervix, by proliferating under the edge of the cylindrical epithelium and gradually forcing it off. If the cervix has been lacerated and everted, some of the cervical glands are exposed in the vagina. In growing to the new external os at the edge of the laceration, the squamous epithelium surrounds and invades the ducts of these glands. Occasionally it fills a duct and forms a plug which may extend inward for some distance. When a cross-section is seen under the microscope, a first glance gives the impression of an epithelial prolongation deep in the tissue that is suggestive of cancer. This is the final stage of healing which endures as long as the cervicitis is quiescent.

These processes do not follow an orderly sequence. The chronic cervicitis may flare up and subside from time to time in the course of

years. The two types of epithelium are thus kept in a state of restlessness, sometimes over long periods. In view of this state of restlessness it is not to be wondered at that the growth of the epithelium may become excessive and encourage the development of carcinoma.

Another point in favor of the view that cervicitis stimulates cancer is that patients with procidentia very rarely have cancer of the cervix. There has been only one such case in 683 cases of third degree procidentia at the Free Hospital for Women. (This is the only case ever seen in the experience of the staff.) The cervix in procidentia is exposed to mechanical irritation and not infrequently is chronically ulcerated from friction. It remains dry, however, and is not subjected to con-

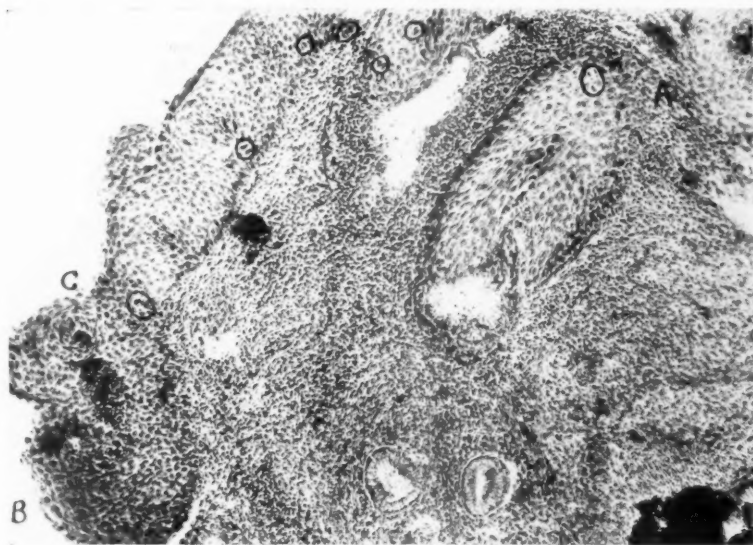


Fig. 1.—Photomicrograph of section from a trachelorrhaphy specimen removed in 1916. (Diagnosis: Chronic cervicitis.) Four years later the patient received radium for advanced squamous carcinoma of the cervix and died soon afterward. The original trachelorrhaphy specimen was rediagnosed carcinoma on the section from which the above picture was taken and on the patient's history. Note absence of basal layer on either side of A and to the right of B. The cells differentiate poorly. Mitoses are indicated by circles.

stant maceration, because there is little or no cervicitis and no obstruction to drainage. The squamous epithelium becomes thickened and hypertrophied, but remains in a stable condition.

During the period of warfare between the cervicitis and the two types of epithelium in the cervix, many different pictures are found which have been considered precancerous. When the squamous epithelium is proliferating during the process of healing, it is likely to grow in places in an atypical manner. Gross areas of leucoplakia may be seen; hypertrophy may take place even to the extent of polyp formation. Microscopically the cells may be larger and stain more

deeply than the normal; they may be somewhat irregularly arranged, especially in the transitional layers, and may show occasional mitotic figures. Prolongations often grow down into the stroma, especially in leucoplakic areas. Rarely epithelial pearls are found in these same areas even though the condition is not malignant (Halban and Seitz).

If the examination be thorough, these healing processes may be found in almost any case of cervicitis, with or without a preceding laceration. If these are precancerous conditions, then every lacerated or infected cervix is in a precancerous state. Fortunately cancer arises comparatively infrequently. It is just this infrequency which predicated the lack of knowledge of the actual causes that produce

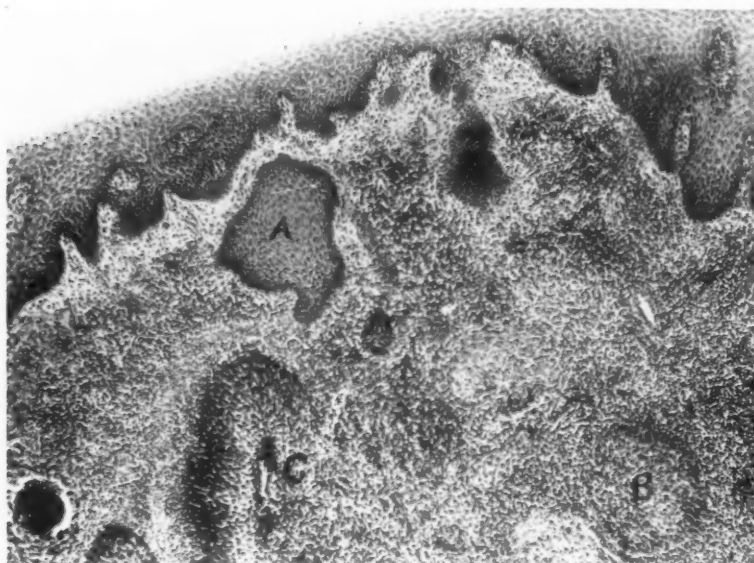


Fig. 2.—Early squamous carcinoma of the cervix. The patient was admitted in April, 1927, because of staining. Biopsy of curettings, of curettings from endocervix, and of specimen from the external os were negative. Eight months later the patient was readmitted. Three soft, red, bleeding ulcers, all less than 0.7 cm. in diameter, without raised edges, were found on the vaginal portion of the cervix at a distance of 0.5 to 1 cm. from each other and from the external os which appeared normal. Wassermann and pelvic examination were negative. The ulcers were excised and 200 mg. of radium (screened by 0.5 mm. of silver, 0.5 mm. of brass and 1 mm. of rubber) were applied for twenty-four hours. The patient is well and examination negative one year later. The above is from the edge of an ulcer. The squamous epithelium is hypertrophied. A comparison of A with B and C demonstrates the contrast between a benign and malignant overgrowth of squamous epithelium.

cancer. On the other hand, any patient having the condition described is liable to develop cancer. Since it is impossible to determine who will have the disease, all such patients should be treated in order to cure or remove the chronically inflamed tissue.

Although these healing processes are generally recognized, individual pathologists do not agree as to when the boundary between benign and malignant growth is reached. It is difficult to decide in any one

suspicious case whether cancer or precancerous changes are present. It is reasonable that this should be so because so many stages of change and growth may be found. It is important that the diagnosis be made before there is any destruction or gross infiltration of the stroma.

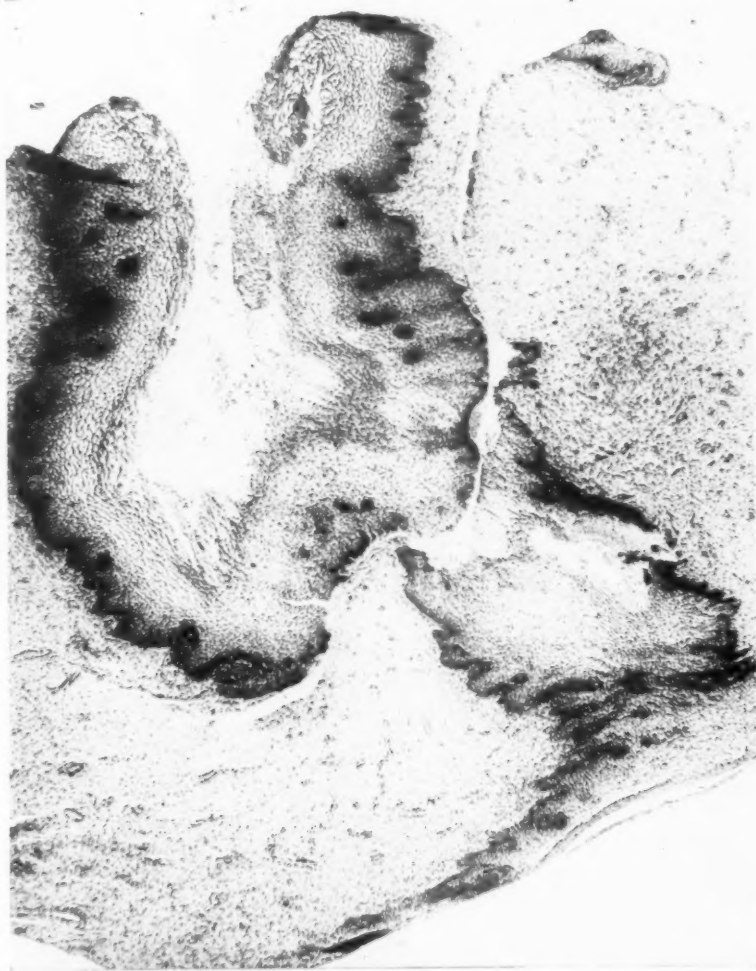


Fig. 3.—Hypertrophy and hyperplasia of squamous epithelium (from same trachelorrhaphy specimen as Figs. 4 and 5). There is a good basal layer and the cells differentiate well. This is a leucoplakic condition and is understood to be "precancerous." It is seen most commonly, however, in the cervix of cases with marked prolapse in whom cervical carcinoma is of very rare occurrence.

The histologic appearance which we have described above is benign. When this is accompanied by a basal layer which is undifferentiated from the transitional cells and, on closer examination, consists of irregularly arranged cells with mitotic figures, has no basement membrane,

and sends into the stroma prolongations fronted by an inflammatory infiltration, we feel justified in calling the condition one of early cancer.

The plugs of epithelium in the ducts of glands may be misleading, especially if they are cut on a slant. It must be remembered that they are the result of a normal healing process and, although suspicious, are not malignant unless there is poor differentiation and a general atypical arrangement of their cells. Areas of epithelium cut on the slant frequently show some irregularity of the basal layer but, if contiguous parts appear normal, these are not usually diagnosed as cancerous.



Fig. 4.—Section from trachelorrhaphy specimen from a patient treated for lacerations. Definite carcinoma is seen on the left; moderately hypertrophied epithelium on the right. At this stage the disease seems to be a process spreading laterally, but apparently not invading. Note distribution of inflammatory reaction. Of special interest in this case is the fact that the malignant changes are taking place in practically normal epithelium and not in the "precancerous" areas. The patient received 4800 mg. hours of radiation from screened radium and is now well one year, two months later.

It is wise to examine more than one part of the tissue microscopically because a malignant change may be found anywhere. This procedure is not difficult or time consuming. Three or four pieces of tissue are embedded in the same block, sections being cut at different levels.

We feel that one of the most important factors in the diagnosis of early cancer of the cervix is the experience obtained by studying many microscopic slides from cervical tissue. It is only by constant practice that one can distinguish between the many changes due to

inflammatory, reparative, and malignant processes. The tissues from other organs do not give analogous pictures.

The rule at the Free Hospital for Women since 1902 has been to examine microscopically all cervical tissue that has been removed for one reason or another. If the patient's history or the appearance of a cervix be at all suspicious, small specimens are taken for biopsy. In this manner cancer has been found microscopically in 16 cases in which neither the gross appearance of the cervix nor the gross characteristics of the tissue removed sufficed for a definite diagnosis. This figure is 2.39 per cent of the total number of cervical cancers seen at



Fig. 5.—High power from transition area of Fig. 4. This picture almost suggests a contagious rather than an invasive process. A and B indicate the borderline where the cells fail to differentiate.

the Free Hospital for Women. None of the group had had a previous cervical operation. One patient who had never been pregnant had a cervical polyp which showed adenocarcinoma with some squamous metaplasia. The others had had their last pregnancy from one to thirty-one years previously, the average being 15.18 years. Frank⁶ has found cancer microscopically in only 2 unsuspected cases, and others state that it is rare to discover the disease when the macroscopic appearance is not suggestive. Schottländer,⁷ on the other hand, found cancer on microscopic examination alone in 2 per cent of his cases.

We believe that all chronically inflamed and eroded cervixes should be treated or watched and that there should be no hesitation in re-

moving pieces for diagnosis. The danger of spreading the disease by instrumentation in cancer of the cervix is overrated. In a study of 550 cases of carcinoma of the cervix seen at this clinic, it was found that 13 of the 24 patients who lived longest after treatment had had preliminary curettage or curettage and cauterization. Janet E. Lane-Claypon,⁸ in reviewing a large series of autopsies, states that "the total number of cases having either glandular or visceral deposits was . . . 406 out of 914 cases, or 44.4 per cent. Therefore, on this very large series it is shown that over one-half of the patients died without any extension of the disease beyond the pelvis, and not even

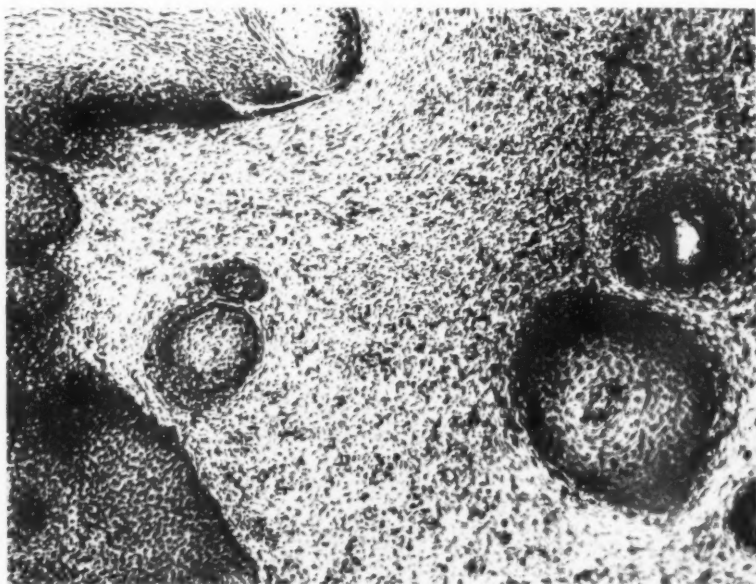


Fig. 6.—"Suspicious cervix." Here the alveoli show mitoses and an active basal layer and the surface epithelium is markedly hypertrophied. The cells, however, differentiate well. The patient was well four years, seven months after trachelorrhaphy.

in the pelvic glands. That is, the patient died by direct extension of the growth, coupled, probably, with exhaustion from septic absorption." If this type of cancer were prone to metastasize, the ordinary activities of the patient and the invasive, erosive properties of the tumor would result in a very high percentage of metastases despite meticulous precautions in the matter of instrumentation; and any apprehension of this occurrence may now be avoided by use of the fine cautery or electric cutting needle.

In the treatment of chronic cervicitis most stress should be laid on curing the cervicitis, for when that is relieved the cervix will heal over. The treatment involves destruction or removal of the infected cervical glands. The methods now in use are the cautery, some form

of amputation of the cervix, radium, and repair of lacerations. Although treatment may not completely cure the cervicitis, it relieves the condition markedly; therefore, so far as chronic irritation is concerned, the treatment of cervicitis may be regarded as a preventive of future cancer.

Although it has not been proved scientifically that treatment of the diseased cervix is a prophylactic against cancer, there are some suggestive and fairly convincing facts.

In a series of 3814 trachelorrhaphies, 740 amputations, and 1408 cauterizations of the cervix, a total of 5962 cases, covering a period of fifty-two years at the Free Hospital for Women, only 5 are known



Fig. 7.—“Suspicious cervix.” This was the only section in which early carcinoma could not be ruled out with a fair amount of assurance. Despite the leucoplakia, alveoli and mitoses there is a fairly well defined basal layer and the cells differentiate well. The patient had her seventh child four years after the trachelorrhaphy and was well six months later.

to have developed cancer of the cervix, and these were in the trachelorrhaphy group.

Even more convincing are the figures of Levin⁹ who, in 613 cases of cancer of the cervix, found only 2 in which a previous cervical repair had been performed. We have found 12 such cases out of a total of 669 cancers of the cervix. In none of our series had there been any pregnancy between the repair operation and the time when carcinoma was diagnosed. The time relations between the last pregnancy, trachelorrhaphy, and diagnosis of carcinoma are given in Table I.

Eight cases (1909 to 1925) in which cervical specimens had been

diagnosed as precancerous were reviewed. Two were cervical polyps; the others were biopsy or trachelorrhaphy tissue. One patient was unmarried; the others had had their last pregnancy six months, a year and a half, a year and a half, eight, eight, fifteen and twenty-seven years previously. (Average 8.78 years.) Of five patients of this group whose suspicious cervixes received no further treatment,

TABLE I

INTERVAL BETWEEN LAST PREGNANCY AND REPAIR OPERATION	INTERVAL BETWEEN CERVICAL REPAIR AND DIAGNOSIS OF CARCINOMA	INTERVAL BETWEEN LAST PREGNANCY AND DIAGNOSIS OF CARCINOMA
1. 10 years	11 years	21 years
2. 16 "	6 "	22 "
3. 6 "	5 "	11 "
4. 10 "	8 "	18 "
5. 10 "	20 "	30 "
6. 9 "	7 "	16 "
7. 1 month	16 "	16 "
8. 7 years	12 "	19 "
9. 1 year	7 "	8 "
10. 7 years	10 "	17 "
11. 19 "	9 "	28 "
12. Unknown	Unknown	9 "
Average 8.63 years	Average 10.9 years	Average 19.53 years

1 is untraceable (letter, state directory and state death records) and 4 were alive and well five years three months, seven years five months, fourteen, and nineteen years later, respectively. The other 3 patients were considered to be in sufficient danger to merit prophylactic radium application (25 to 150 mg. screened by 0.5 mm. of silver and 1 mm. of rubber for from five to twelve hours). One of these patients died five weeks later, after an operation at another hospital. The other 2 are well three years two months and six years four months after operation.

The sections from 150 routine trachelorrhaphy specimens for the year 1922 were then reexamined and 20 were classed as suspicious and possibly precancerous. The patients had had their last pregnancies one to thirty-four years previously. (Average 7.67 years.) Four had radium treatment (100 to 150 mg. for from ten to twelve hours); 1 is untraceable, the others are well from four to five years after operation. Of the 16 remaining patients 2 are untraceable and 14 are well four and one-half to five and one-half years after discharge from the hospital.

One hundred and ten sections from cervical specimens for the hospital year 1915-1916 were reexamined, and 15 were considered suspicious. One patient had never been pregnant. The others had had their last pregnancy one, one, one and one-half, two, three, four, five, five, six, seven, nine, ten, twelve, fourteen, and sixteen years previously. (Average 6.57 years.) Eight are untraceable; the other 7 are well from nine to twelve years after discharge.

Thus, in these series not one patient whose cervical specimen was

suspicious but not malignant has been found to have developed cancer, although sufficient time has elapsed since operation. It is not improbable that the repair acted as a preventive in at least a few of these patients. Only more extensive studies along the lines indicated above can point to more definite conclusions. The most impressive fact is the long interval between pregnancy and repair (8.63, 8.78, 7.67 and 6.57 years); between pregnancy and the diagnosis of carcinoma (19.53 and 15.18 years); and between repair and the diagnosis of carcinoma (10.9 years).

It would seem that if chronic irritation is an important factor in the etiology of cancer, as is believed by most authorities, the body must present strong defense against it, because the irritant requires so long a time before it produces the malignant change. It is easier to discover this period of time in carcinoma of the cervix than in that of the lip, tongue, stomach, etc., since the date of the beginning of the inflammation can be more definitely set. The facts that the trauma of pregnancy has occurred previously in at least 90 per cent of cases of carcinoma of the cervix and that very few patients with cancer give a history of repair operations on the cervix are good evidence that the treatment of inflamed, eroded cervixes is a valuable prophylaxis against cancer.

SUMMARY AND CONCLUSIONS

1. The histology of the normal and pathologic cervix uteri has been briefly summarized. Its precancerous and early cancerous changes have also been described.

2. Long experience in the study of cervical tissue is necessary if one is to decide in any given instance whether or not cancer is present.

3. Of 669 cases of carcinoma of the cervix seen at the Free Hospital clinic, 2.39 per cent were diagnosed on the basis of microscopic examination, the gross findings being inadequate for a diagnosis.

4. There should be no hesitation about excision of cervical specimens for biopsy. In this series no harm is known to have come to a patient from the procedure, and it was a life-saving measure in 10 of the 16 cases of early cervical carcinoma. The other 6 carcinomas were found by routine microscopic examination of trachelorrhaphy specimens.

5. That only 5 out of 3814 patients on whom trachelorrhaphy was performed, and that none out of 1408 whose cervixes were cauterized, and that none out of 740 whose cervixes were amputated are known to have developed carcinoma, suggest that treatment of diseased cervixes may be a prophylactic measure as regards the incidence of cancer. That only 12 out of 669 patients with carcinoma of the cervix had had trachelorrhaphy and that none had had cauterization or amputation, also suggests the prophylactic value of careful cervical treatment.

6. Long follow-ups of patients whose cervical specimens were microscopically suspicious failed to find the development of carcinoma in any instance. Although in the very rare case it cannot be decided microscopically whether or not cancer is present, in the majority of cases the decision may be made quite definitely.¹

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A ROENTGENOGRAPHIC STUDY OF PLACENTAL INFARCTS

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THE study of the circulatory changes of the human placenta by means of the usual microscopic methods has been most extensive. On this subject alone the literature has amassed to such an extent that at the present time it would appear that a great deal of further information is not to be expected from this form of investigation alone. With a view to approaching the subject in some other manner, we have, during the past year, made a study of placentas injected with barium sulphate, and then roentgenographed in a manner to be described in this communication. In this way, we have been able to see what relationship of local circulatory disturbance was to the entire placental circulation. To paraphrase a well-known expression, we have overlooked the trees in order to study the forest. We have, of course, also employed the usual microscopic methods of investigation, in order to check the results of our procedure. In discussing this approach to the subject, mention should be made of the work of Fraser,¹ who used a somewhat similar procedure in a study of placental circulation. To those interested in the architecture of placental circulation, his paper contains valuable information. The chief interest of the present communication has been directed toward placental circulatory arrest due to infarct formation, and the measurement of such arrest on a percentage basis.

The findings in the cases which have been studied for this purpose are interesting but not revolutionary, and in presenting the work attention is drawn not only to these results but also to the method of investigation. The technic, therefore, will be first described.

After some experimentation, the following procedure has been found satisfactory, and adopted as a routine for this study.

As soon as the placenta is delivered, it is dropped into a vessel containing enough 5 per cent sodium citrate solution to cover the specimen entirely. The injection may be done at once, or if more convenient, which is usually the case, at a later period. In the latter instance, the container and specimen are placed in the ice box, where they may remain as long as twenty-four hours without affecting the success of the injection.

When the injection is to be made, the following steps are to be carried out: The cord is cut about two inches from its base and a double flanged cannula is inserted into the umbilical vein and held in place with a mass which ligature encloses both arteries and vein. The placenta is transferred to a basin of warm water (about 60° C.), and a bottle containing physiologic saline is placed in the same basin. The proper connections having been made, the saline is washed through the placenta under a pressure of 125 mm. mercury. Back-flow through the arteries is watched for, and as distention takes place, the arteries are cut near the cannula and the blood is washed out. Washing is continued under pressure for twenty minutes until the organ is pale and no blood is present in the back-flow. The specimen is then removed from the basin and a small cannula with a small flange is inserted into each artery. These cannulas are connected with a Y-tube, through which the injection material passes. The following formula is used for the injection:

Distilled water	1700
Gelatine	300
Barium sulphate	1000
Thymol	2

This solution is heated to 50° C., and as before put into the basin with the specimen. The same pressure is used, and the maternal surface is carefully watched to determine the presence of the solution in the cotyledons. After about fifteen minutes the injection is complete. The placenta is removed and placed in cold water to solidify the gelatine. The specimen is now ready for the roentgenograph of the flat specimen. After this procedure, the specimen is placed in 10 per cent formalin, where it remains for from twenty-four to forty-eight hours. When sufficiently hardened, the placenta is cut into strips approximately 1 cm. wide, which are laid parallel to one another on a sheet of glass. A roentgenogram of these strips is now made. By studying the cross-sections not only may small areas of circulatory arrest be noted, but the percentage of such arrest in relation to the total placental circulation may be readily computed. Since injections made in this manner in no way disturb the histologic structure of the placenta, it is our custom when infarcts are noted in the gross, or when circulatory arrest is seen in the roentgenogram, to take sections for microscopic study.

From our study of 58 placentas prepared in this way, certain facts emphasized themselves:

First.—Marginal white infarct formation is so common that it may be considered a normal phenomenon of the mature placenta. The amount of circulatory disturbance at the edge of the placenta as a result of such infarcts is so slight as to be negligible.

Second.—The small white infarcts which are so frequently seen scattered over the fetal surface are for the most part purely surface affairs in the greater number of cases; there is no change in the

PLACENTA NUMBER	PERCENTAGE AREA INFARCTED	GROSS APPEARANCE	PRESENCE OF TOXEMIA	REMARKS
1. P 6406	No measurable infarction	Normal appearance	None at any time	
2. P 6431	3% infarcted	Normal appearance	None at any time	Labor complicated by pre-mat. separation; version and extraction. See figs.
3. P 6440	No measurable infarction	Normal, large size	None at any time	
4. P 6443	No measurable infarction	Normal appearance	None at any time	
5. P 6441	No measurable infarction	Normal appearance; few calcified areas	None at any time	
6. P 6442	No measurable infarction	Normal appearance	None at any time	
7. P 6444	No measurable infarction	Normal appearance	None at any time	
8. P 6432	No measurable infarction	Normal appearance; sl. marginal infarct	None at any time	
9. P 6430	No measurable infarction	Normal appearance; placenta bipartia	No toxemia during pregnancy	B.P. on admission 160/80. No other signs present
10. P 6429	No measurable infarction	Normal appearance; cord-marg. insert.	None at any time	
11. P 6428	No measurable infarction	Normal appearance	None at any time	
12. P 6511	No measurable infarction	Normal appearance; Marginal infarct 2/3 circumference	None at any time	
13. P 6490	No measurable infarction	Partial marginal infarct; 1/3 circum.	None at any time	
14. P 6510	No measurable infarction	Partial marginal infarct; 1/3 circum.	None at any time	
15. P 6612	No measurable infarction	Normal appearance; Small infarct (white) 3x3 cm. at base of cord	None at any time	(Infarct at base of cord superficial, no interference with circulation)
16. P 6525	No measurable infarction	Normal appearance; sl. marginal infarct	None at any time	
17. P 6538	No measurable infarction	Normal appearance	None at any time	
18. P 6539	No measurable infarction	Normal appearance	None—see note	(Patient said to have had a "convulsion" at home, but no evidence of toxemia could be demonstrated at the hospital)
19. P 6541	No measurable infarction	Normal appearance; marg. infarct 2/3 circumference	Not at any time	
20. P 6540	2% infarcted	Marg. infarct 1/3 circumference—several white infarcts near marg.	Not at any time	
21. P 6548	No measurable infarction	Normal appearance; infarct at base of cord 2x3 cm.	None at any time	

PLACENTA NUMBER	PERCENTAGE AREA INFARCTED	GROSS APPEARANCE	PRESENCE OF TOXEMIA	REMARKS
22. P 6531	5% infarcted	Marginal infarct 2/3 circumference; infarct 4x3 at margin	None at any time	
23. P 6570	No measurable infarction	Marginal infarct 2/3 circumference; few small white infarcts on fetal surface	None at any time	
24. P 6574	13% infarcted	White infarct 5x6 cm. at base of cord	None at any time	
25. P 6560	No measurable infarction	Normal appearance	None at any time	
26. P 6584	5% infarction	Marginal insertion of cord; white infarct 3x4 cm. fetal surface at base; marginal infarct 3/4 circumference	None at any time	
27. P 6581	No measurable infarction	Marginal infarct 4/5 of circumference	None at any time	
28. P 6585	No measurable infarction	Marg. infarct 2/3 of circumference; few small white infarcts on fetal surface	None at any time	
29. P 6591	No measurable infarction	Marginal infarct 1/3 circumference		
30. P 6610	No measurable infarction	Marginal infarct 1/3 circumference	Definite preeclamptic toxemia, induction of labor, followed by return to normal	
31. P 6609	No measurable infarction	Small infarct at base of cord; fetal surface	None at any time	
32. P 6603	No measurable infarction	Normal appearance	None at any time	
33. P 6602	No measurable infarction	Marginal infarct 2/3 circumference	None at any time	
34. P 6600	No measurable infarction	Marginal infarct 1/3 circumference	None at any time	
35. P 6619	No measurable infarction	Marginal infarct 2/5 circumference; white infarct 3x3 cm. at base of cord	None at any time	
36. P 6618	No measurable infarction	Marginal infarct 4/5 circumference; white infarct 3x3 cm. at base of cord	None at any time	
37. P 6627	15% infarcted	2 white infarcts 4x4 cm.; fetal surface; marginal infarct 4/5 circumference; white infarct at margin 3x3	Pt. induced for preeclamptic toxemia at eighth month	
38. P 6594	No measurable infarction	Marginal infarct 1/3 circumference	None at any time	
39. P 6597	No measurable infarction	Marginal infarct 1/3 circumference	None at any time	
40. P 6596	No measurable infarction	Normal appearance	None at any time	
41. P 6590	No measurable infarction	Normal appearance	None at any time	
42. P 6613	No measurable infarction	Marginal infarct 1/3 circumference	None at any time	
43. P 6617	No measurable infarction	Marginal infarct 2/3 circumference	None at any time	

PLACENTA NUMBER	PERCENTAGE AREA INFARCTED	GROSS APPEARANCE	PRESENCE OF TOXEMIA	REMARKS
44. P 6632	No measurable infarction	Normal appearance	Definite nephritis toxemia of pregnancy	
45. P 6638	No measurable infarction	Normal appearance	None at any time	
46. P 6628	No measurable infarction	Marginal infarct 2/3 circumference; white infarct 2x3 cm. at base of cord	None at any time	
47. P 6620	No measurable infarction	Marginal infarct 2/3 circumference; few small white infarcts on fetal surface	None at any time	
48. P 6647	12% infarcted	Fetal surface, marg. infarct 3x6 cm.; maternal surface several white infarcts, largest measure (10x2) (3x4) (2x1) cm.	None at any time	
49. P 6644	No measurable infarction	Placenta succenturiata, lobe 7x4 cm.	None at any time	
50. P 6646	No measurable infarction	Marginal infarct 2/3 circumference; few small white infarcts on fetal surface	None at any time	
51. P 6655	No measurable infarction	Marginal infarct 3/4 circumference; base of cord infarct 10x5 cm.; several 1.3 cm. on fetal surface	None at any time	
52. P 6656	24% infarcted	Marginal 1/3 circumference	None at any time	
53. P 6661	No measurable infarction	Marginal 1/3 circumference	None at any time	
54. P 6669	4% infarcted	Marginal 1/2 circumference; base of cord 4x4 cm.	None at any time	
55. P 6645	No measurable infarction	Marginal 3/4 circumference	None at any time	
56. P 6678	No measurable infarction	Marginal 2/3 circumference; few scattered white infarcts on fetal surface	None at any time	
57. P 6678	No measurable infarction	Marginal 2/3 circumference	None at any time	
58. P 6679	10% infarcted	Marginal 2/3 circumference; white infarct 3x3 cm. near margin	No toxemia. Patient probably a chronic alcoholic	

subjacent circulation. This statement applies also to the white infarcts which are so frequently noted at the place of insertion of the cord. In fact, infarcts on the fetal surface, even of wide extension, seldom affect the circulation of the placenta to any degree. We have seen a large area of the fetal surface involved by a white infarct, yet, on cross-section and roentgenographic examination have found the circulatory arrest limited to structures lying one or two millimeters below the fetal surface.

Third.—In this series no definite relationship between infarct formation and the toxemia of pregnancy was noted. We observed

typical cases of toxemia in which no apparent circulatory disturbance was seen, and on the other hand, infarct formation with measurable circulatory arrest was noted in a number of cases in which no sign or history of such toxemia could be elicited.

In the accompanying table, where the amount of circulatory arrest was less than 1 per cent, a notation of "no measurable infarction" is made. The method of computing the amount of such arrest is a matter of studying each cross-section strip roentgenogram, calculating the circulatory arrest of that strip, and so the percentage of

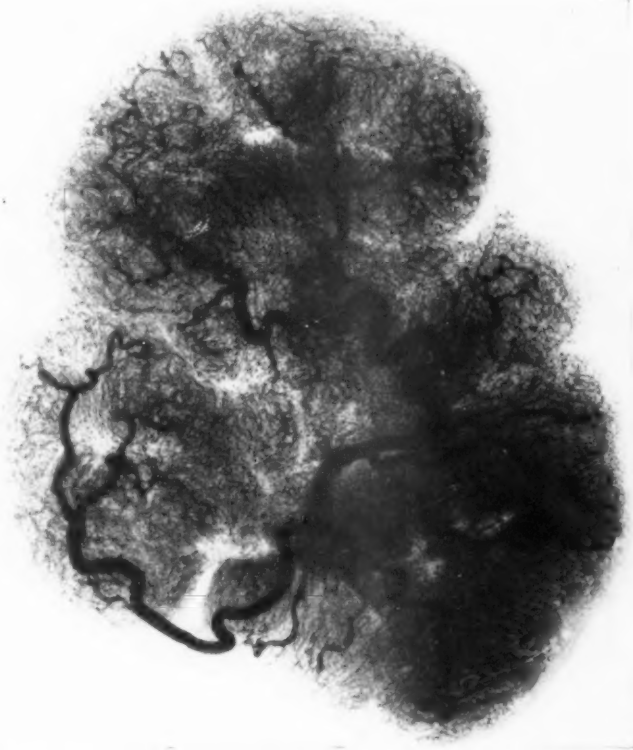


Fig. 1.—Roentgenogram of placenta (flat plate). No measurable circulatory arrest due to infarct formation.

arrest for the entire organ. Some idea of just what such percentage of arrest means may be gained from the investigations of Dodds,² who showed that the area of the villi in the human placenta at term is about seven square meters.

COMMENT

In this study of 58 placentas injected and roentgenographed in the manner described, 10 placentas, or 17 per cent, were found infarcted to a degree which actually interfered with the placental circulation. In one case (P 6656), 24 per cent of the placental circula-

tion was thus arrested by the process, yet there was no evidence of maternal toxemia or of ill effect upon the baby. I have no doubt that in the study of a larger series than here reported an even greater amount of placental infarction may be present with the same

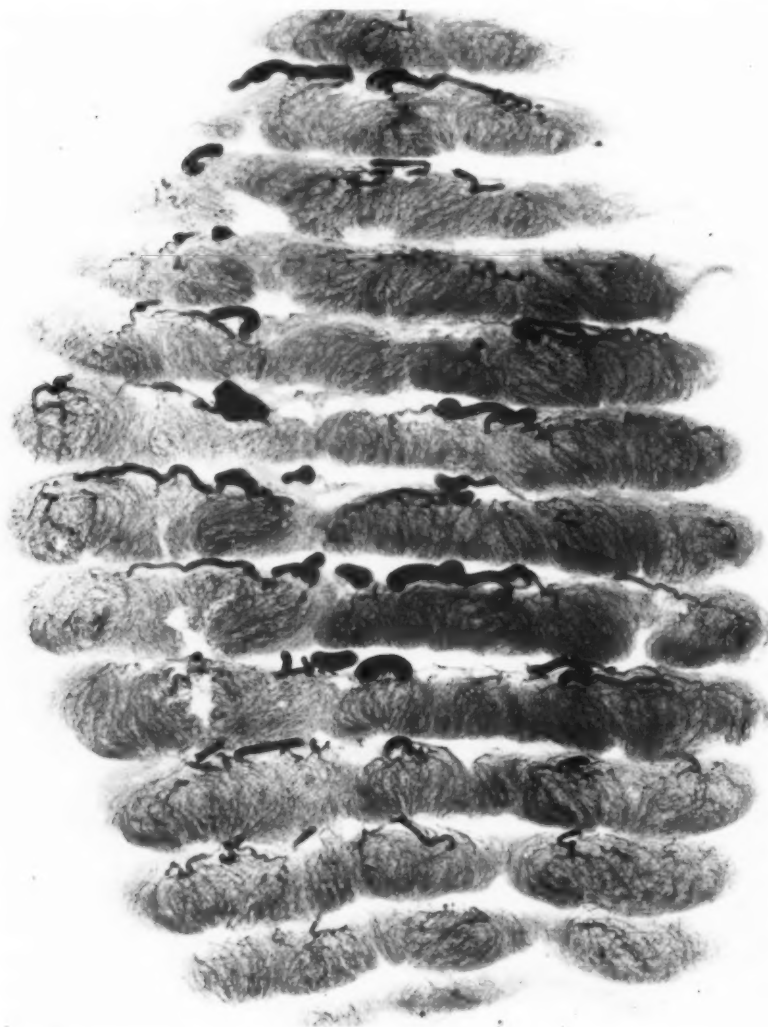


Fig. 2.—Roentgenogram of cross-section strips of placenta. No measurable circulatory arrest due to infarct formation.

finding. It is, however, only by some such method as here delineated that the actual amount of such infarction can be estimated.

In studying the accompanying table, the frequency of marginal infarcts and infarcts on the fetal surfaces at the entrance of the cord, as recorded in the gross description, is noteworthy.

Infarct formation in the placenta may be said to resemble eclampsia

in that it is a "condition of theories." In the main, however, the etiology of placental infarction, as set down principally by Young,³ offers the most attractive explanation of their formation. The chief foundations for this theory are those which he has so ably pointed out. First, chorionic elements are most active during the early stage of development, before fetal vessels are formed. Second, villi proliferate in hydatid mole, and in this condition there are no fetal vessels. Third, tips of villi remain healthy in tubal pregnancy, where the blood supply from the ovum has been cut off by hemorrhage, but where the maternal circulation is unimpaired. From the present investigation, and from previous studies⁴ which I have made, I am led to agree with Young that the villi are dependent upon maternal blood for their nourishment and growth.

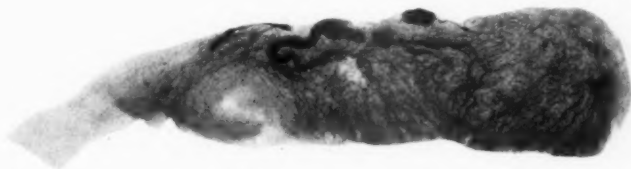


Fig. 3.—Showing circulatory arrest due to infarct formation. See gross cross-section (Fig. 4).

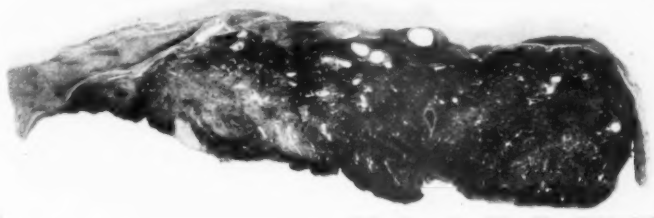


Fig. 4.—Cross-section of placenta showing white infarct near edge of placenta on maternal surface.

Anything, therefore, which interferes with the nutrition of the villi may be expected to produce the lesions which are characteristic of placental infarct formation. This interference is produced by changes in the maternal circulation at the site of placental implantation, and is brought about as a result of interruption of the blood supply of the maternal spaces. That such interruption does occur in the latter months of pregnancy in the uterine sinuses as a result of thrombosis was first brought to our attention by Friedlander, and confirmed by Minot,⁵ who observed as early as the seventh month large thrombi in the venous sinuses of the muscular layer of the uterine wall underlying the placental site. Clementz⁶ states that the condition is essentially a necrosis, which is secondary to the clotting of maternal blood in the intervillous spaces. This clotting may be initiated by fibrin

deposits upon the villi with localized epithelial defects, and is aided by the slowness of the blood stream in the placental circulation.

These observations seem to account very well for infarcts seen in their various stages of formation in the substance of the placenta or on the maternal surface of that organ, but for those superficial white infarcts which are so frequently seen limited to the fetal surface and to the margin of the placenta, it would appear that either another speculation or an extension of the above theory becomes necessary. I believe the latter to be the case; that is, that these superficial white infarcts are also an expression of the failure of the maternal blood to carry on the nutrition of the villi. It is probable that it is difficult

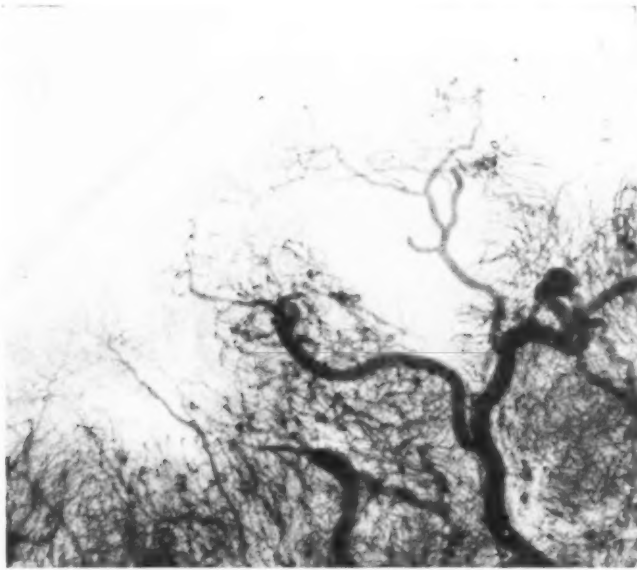


Fig. 5.—Infarct at edge of placenta, roentgenogram showing circulatory arrest. Flat picture.

for the villi to carry on their existence at certain points remote from the uterine sinuses. This accounts for the frequency of white infarct formation upon the fetal surface at the entrance of the cord vessels, where, especially in the latter months of pregnancy, the maternal circulation may be insufficient to carry on the proper nutrition of the villi. It also accounts, I believe, for the frequency of white marginal infarcts. It is not difficult to imagine that at the very edge of the placenta, particularly in the latter weeks of pregnancy, the maternal circulation may be so poor as to interfere with the proper nutrition of the villi at this point. Nor is it difficult to understand the gradual growth by extension of a necrosis of this sort. Another proof of the maternal nutrition theory is found in the fact pointed out by Eden⁷ that in the membranes immediately outside of the placenta embedded

villi may be found in all stages of atrophy and disappearance, an exact counterpart of the process seen in infarction. This theory also accounts for the fact that fetal surface and marginal infarcts are practically always of the white (anemic) type. On microscopic examination they show a close packing together of the villi, with no blood in the intervillous space, as if their very remoteness from the maternal sinuses were the primary cause of the failure of nutrition.

Such a condition would presuppose a change particularly in the maternal arterial circulation of the uterus, and that this does occur before labor was pointed out by Goodall⁸ in his work on involution of the uterus.

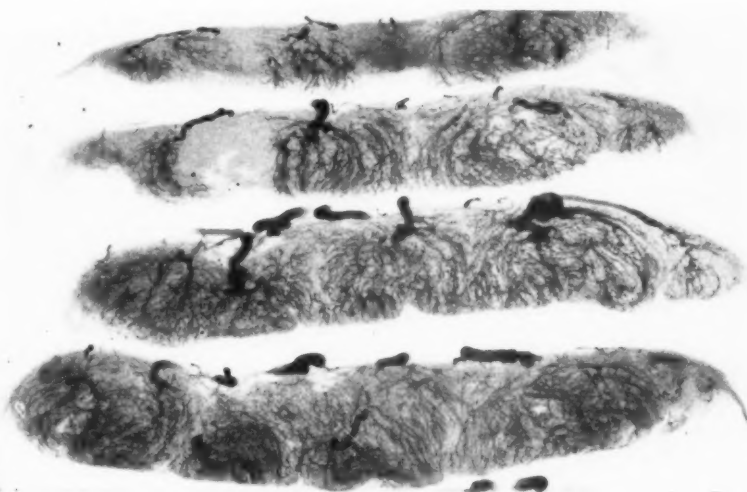


Fig. 6.—Cross-section roentgenogram of Fig. 5, showing circulatory arrest due to infarct formation.

While no attempt in the present investigation has been directed toward the etiology of red (hemorrhagic) and white (anemic) infarcts, yet in commenting upon the cause of these two varieties, it seems to me obvious that their production may be explained by the usual method of their formation in other locations.

With regard to the present investigation of placental circulation, it may further be observed that vascular changes in the entire placenta may be shown to students in a manner not possible with other demonstration.

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NEW HAVEN HOSPITAL.

THE DIAGNOSIS OF EARLY PREGNANCY THROUGH THE DETECTION OF FEMALE SEX HORMONE IN THE URINE

A PRELIMINARY REPORT

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THE need of an accurate test to determine the gravid state is generally recognized. The sugar tolerance test is commonly spoken of as of some value. The weakest point in the sugar tolerance test is not its failure to diagnose pregnancy in 40 per cent of the cases, but rather the large number of positive results it yields in nonpregnant women. (Scheffey.¹) In this respect the test herein described is of much greater value. The normal nongravid state yields only a weakly positive reaction in 8 per cent.

Aschheim's and Zondek's² discovery of anterior pituitary hormone in the urine of pregnant women and its application in the diagnosis of early pregnancy was the incentive for our investigation as to the presence of ovarian hormone in the urine of women during early gestation. Parenthetically, permit us to note the difference in action between the anterior pituitary hormone and the sex hormone present in the unruptured ovarian follicle, the corpus luteum, and placenta. The first is said to exert its influence on the ovaries, causing immature follicles to ripen and corpora lutea to form. In fact, Zondek³ designates the anterior hypophysis "the motor of ovarian activity." It has no direct influence on the uterine and vaginal mucosa. The female sex hormone, on the other hand, exerts little or no influence on the follicular apparatus. It does, however, as demonstrated by Allen and Doisy,⁴ have a profound stimulating influence on the lower genital tract, bringing about estrus in castrated mice and rats.

Contrary to the observations made by Aschheim and Zondek,² we found varying quantities of female sex hormone in the urine of pregnant women as early as one week after the first missed period. With the advance of pregnancy the hormone is demonstrable in the urine in greater concentration.

The detection of ovarian hormone in the urine, as compared with the complicated procedure of demonstrating anterior pituitary hormone, is comparatively easy and applicable in the routine work of a gynecologic laboratory.

Allen, Pratt, and Doisy⁵ demonstrated the presence of follicular

hormone in the human corpus luteum of early pregnancy, and larger and increasing quantities in the growing placenta.

Frank and Goldberger,⁶ despite their ingenious method, were unable to detect this hormone in 40 c.c. of human blood before the tenth week of pregnancy, when placentation is definitely established. Thereafter they found the hormone concentration in the blood in direct ratio with the growth of the placenta.

Employing the method of these two investigators, we have examined the blood of a large number of women during the different menstrual phases and various stages of pregnancy and can subscribe to the accuracy of their observations.

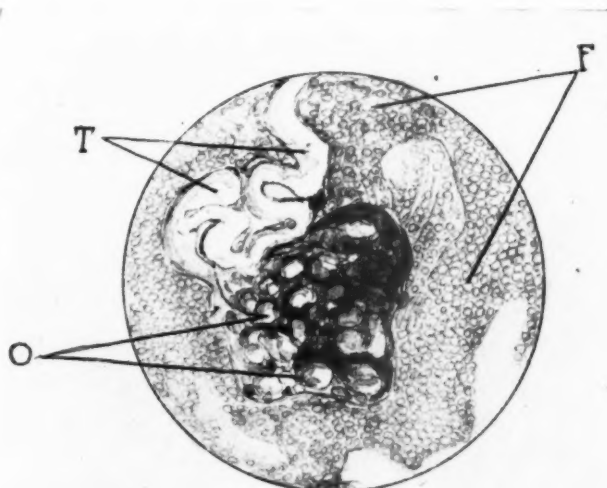


Fig. 1.—Drawing of ovary of mouse as seen when pressed between two slides (low power). *F*, fat; *T*, tubes; *O*, ovary.

It seems paradoxical that the hormone of the corpus luteum of early pregnancy should appear in the urine long before it can be demonstrated in the circulation. Its absence in the urine of most non-pregnant women, even during the last ten days of the menstrual cycle when blood tests, according to the method devised by Frank and Goldberger,⁶ reveal sex hormone in great concentration, cannot easily be explained. For the want of something more tangible, we must assume that the lower threshold and increased renal permeability of early pregnancy permit the small quantity of ovarian hormone then present in the blood to filter through, thus depleting the blood of the hormone. Later, when the placenta supplements the function of the corpus luteum of pregnancy, large quantities of sex hormone appear in the blood, apparently more than the permeability of the

kidneys will permit to filter through. Its presence is then easily demonstrated, both in the blood and in the urine.

We employed the method of Allen and Doisy,⁴ who demonstrated the succession of changes in cell types found in the vaginal lumen of mice and rats during the estrual cycle. Vaginal smears thus serve as indicators of its various phases. As these cyclic phenomena are no longer present after castration, their reappearance following the injection of urine obtained from pregnant women proves beyond doubt that the urine contains female sex hormone.

No test of early pregnancy is of value if the nongravid state yields positive reactions in many cases. It was therefore necessary to test the urine of women during the various phases of the menstrual cycle,

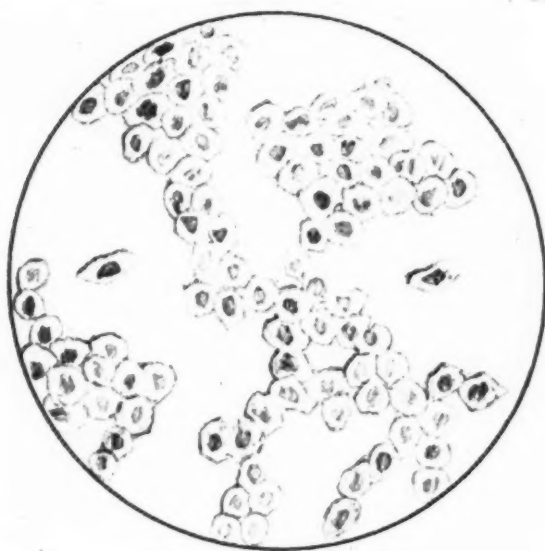


Fig. 2.—Vaginal smear in proestrus: nucleated epithelial cells.

the early menopause, and lactation. The accompanying tables show that the normal nongravid state yields less than 8 per cent of weakly positive reactions.

Acute inflammation of the pelvis renders a high percentage of positive reactions. This test can therefore not be utilized in differentiating between this condition and ectopic gestation.

In two cases herein reported, the reaction antedated the first missed period by a few days. Pregnancy was not suspected in these cases when the urine was tested for the presence of female sex hormone.

TECHNIC

Before castration is attempted, the white mice employed in this work are first tested in regard to regularity of their estrual cycle; old animals may have unresponsive genital organs.

Castration is performed under ether anesthesia through the muscles of the back. An incision is made over the spine, the skin flaps retracted and the ovaries removed through a puncture wound in the overlying muscles. A peritoneal fold running from the ovary to the kidney region is a reliable guide. The specimen, flattened between two slides, is immediately put under the microscope to make sure that the ovary is included in the tissue removed. It is seldom necessary to suture the mus-

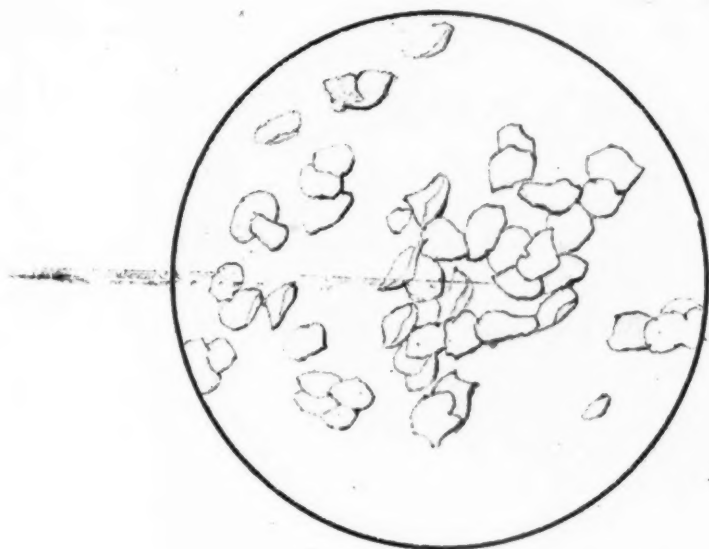


Fig. 3.—Vaginal smear showing estrus: cornified nonnucleated cells.

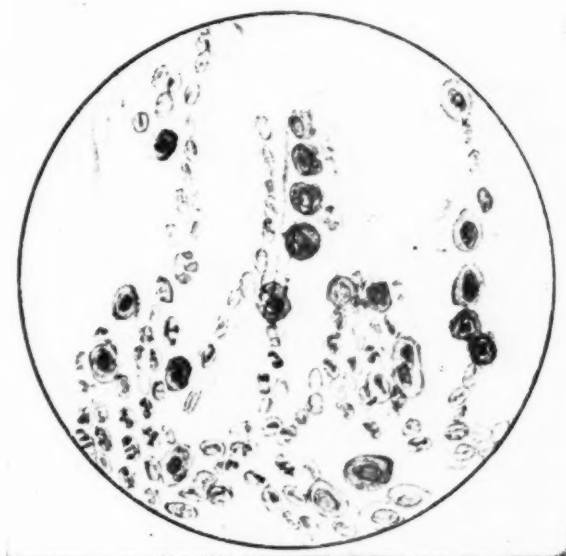


Fig. 4.—Vaginal smear showing diestrus: epithelial cells, leucocytes, and mucous shreds.

TABLE I

URINE OF PREGNANT WOMEN	POSITIVE	NEGATIVE
A few days before the first missed period	2	0
The week after the first missed period	8	2
Second week after the first missed period	7	1
Third week after the first missed period	6	2
Fourth week after the first missed period	6	0
Fifth week after the first missed period	6	1
Third month of pregnancy	8	0
Fourth month of pregnancy	8	0
Fifth month of pregnancy	10	0
	61	6

TABLE II

URINE OF NONPREGNANT WOMEN	POSITIVE	NEGATIVE
First week of the menstrual cycle	1	10
Second week of the menstrual cycle	2	24
Third week of the menstrual cycle	2	28
Fourth week of the menstrual cycle	2	22
Menorrhagia due to hyperplasia	0	6
Puerperium	2	2
Lactation period	0	7
Menopause	0	11
Uterine fibroids	0	6
Ovarian cyst	1	0
Amenorrhea of unknown cause	1	7
Acute pelvic inflammatory diseases	4	4
	15	127

ele wound. The skin incision is closed with linen thread. The experienced technician can do this operation in five minutes with a mortality below 5 per cent. The castrated animal is then kept under observation for two weeks. Vaginal spreads are examined daily in order to exclude the presence of an accessory ovary or regeneration of an overlooked fragment. We maintain a steady supply of 100 castrated animals for the pregnancy test herein described, and for the detection of female sex hormone in the blood of women suffering from ovarian dysfunction, as outlined by Frank and Goldberger⁵

Two animals are simultaneously injected with twenty minims of catheterized urine at two-hour intervals consecutively five times. Daily vaginal smears are continued and recorded in an individual small book dedicated to each animal. When evidence of activity appears in the vaginal spreads, it is necessary to examine the vaginal secretions two or even three times during the following twenty-four hours in order that an estrus may not be overlooked. If only one animal shows a positive reaction, the reliability of the test is thereby not impaired, because urine of normal nonpregnant women rarely shows a strong reaction. The failure of one of the two animals to react strongly to the hormone stimulation may be due to atrophy of the vaginal mucosa incident to a prolonged interval between castration and the test.

Much depends on the correct interpretation of the vaginal spreads.

Diestrus: negative, if there is a preponderance of leucocytes, mucus, and an occasional epithelial cell.

Proestrus: weakly positive, when the vaginal smear contains only a few leucocytes, an excess of nucleated epithelium, and some nonnucleated squamous epithelial cells.

Estrus: positive, if the spread contains no leucocytes, no mucus, a preponderance of nonnucleated squamous epithelial cells, and some nucleated epithelial cells.

Strongly positive if the smear shows only nonnucleated epithelial cells.

One should guard against possible pitfalls if an erroneous diagnosis is to be avoided. The platinum loop, if unskillfully handled, may carry some nonucleated squamous epithelial cells from the vulva and thus convey the impression that these cells are derived from the vagina.

It may be assumed that sex hormone in the urine of women during early pregnancy is not demonstrable in every case because of insufficient concentration. When larger quantities of urine are injected, the test animals invariably die before the appearance of the reaction. The quantity of urine injected is relatively in excess of the weight of the test animal. We are now developing a method of concentrating the urine so that a smaller quantity may yield more hormone for test purposes.

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1829 PINE STREET.

A MYOMA, A SARCOMA, AND A CARCINOMA DEVELOPING IN THE SAME UTERUS*

REPORT OF A CASE WITH A REVIEW OF THE LITERATURE

By Q. U. NEWELL, M.D., F.A.C.S., St. Louis, Mo.

(From the Department of Gynecology, Barnes Hospital and Washington University Medical School)

MYOMA of the uterus is a very common condition; carcinoma of the uterus is fairly common, and sarcoma of the uterus is rare. It is exceedingly rare to have all three types of neoplasm arising in the same uterus and, in reviewing the literature, I have found only four such cases reported. Also, I have found only 20 cases reported of carcinoma and sarcoma coexisting in the same uterus. Probably this condition has occurred more frequently than one imagines, but due to diversified opinion of different pathologists the condition has not been recognized; in the future probably many more cases will be recorded as uterine tumors are studied more carefully.

The object of this paper is to report a case in which a myoma, a sarcoma (spindle cell), and an adenocarcinoma occurred in the same uterus, with a brief review of the literature on this subject.

CASE REPORT

Clinical History.—B. M. A., negress, aged fifty-seven years, was admitted to Barnes Hospital, September 28, 1927, complaining of pain in the lower abdomen

*Read before the St. Louis Gynecological Society, March 9, 1928.

and vaginal bleeding. The family history was irrelevant. The patient was married twice; two pregnancies by first husband, one pregnancy by second husband. Two pregnancies were miscarriages at four months and two months respectively. One child, full term, lived to be fifteen years old and died of heart disease. She has no living children. Her menses began at the age of twelve years and had always been normal until nine years ago when they became profuse and then gradually diminished in amount, and at the age of fifty-three years patient reached menopause in a normal manner.

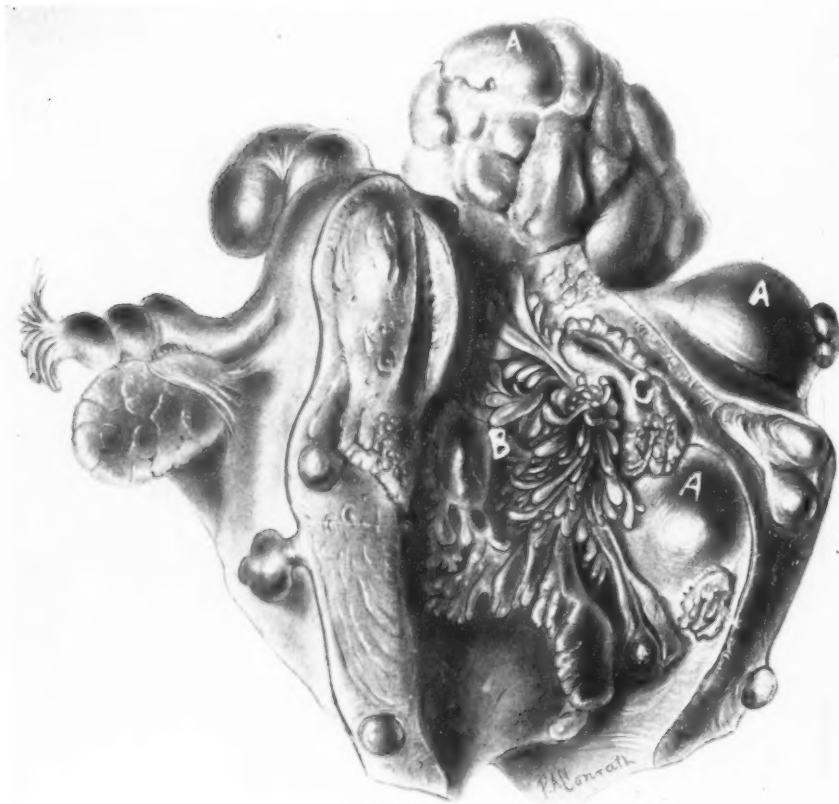


Fig. 1.

The patient dates the onset of her present illness to nine years ago when she consulted a physician for profuse menstruation and was told she had a myoma in the uterus. She was at that time advised to have an operation, but she refused and took much medicine; she seemed to improve and thought she was well until four years ago (fifty-three years of age) when she reached menopause. Several months after menopause, following intercourse, she noticed a slight vaginal bleeding which lasted for several months. Then there was complete absence of any vaginal discharge until February, 1926 (about twenty months ago), when, following a tooth extraction, she noticed a moderate vaginal bleeding for three days which then stopped for several days but recurred at irregular intervals. Since October, 1926, about one year ago, the bleeding has been more profuse and more

frequent. Had some pain in the lower abdomen. Lost considerable weight in the past four years; had a good appetite; the bowels were constipated.

The physical examination was essentially negative except for the abdomen and pelvis. In the lower abdomen could be palpated a definite, firm, nodular mass extending about 8 cm. above the symphysis pubis, apparently arising in the pelvis and fixed. Vaginal examination revealed an enlarged, conical cervix, not eroded and with no evidence of malignancy. The fundus contained many nodules varying in size from that of a marble to that of an orange, forming altogether a mass about the size of a grapefruit. The mass filled the pelvic inlet and made it impossible to palpate either adnexa.

Clinical Diagnosis.—Myoma (multiple) of uterus. Malignancy of the fundus of the uterus cannot be excluded.

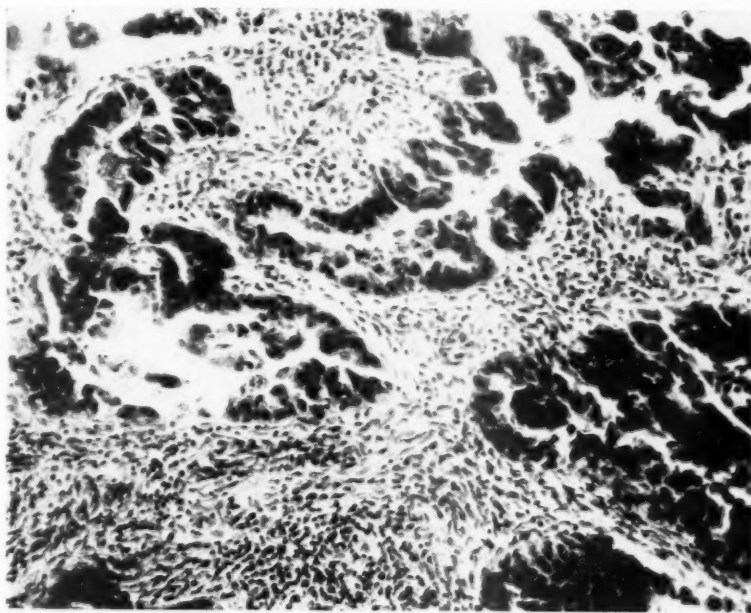


Fig. 2.

Operation.—October 4, 1927 (Dr. Q. U. Newell), abdominal complete hysterectomy, bilateral salpingo-oophorectomy.

Usual midline subumbilical incision. A diastasis of the recti muscles was present. Upon opening the peritoneal cavity a nodular tumor was encountered which was a myomatous uterus. The mass was easily delivered from the abdominal cavity, as no adhesions were present. The complete uterus, with both tubes and both ovaries, intact, was removed in the usual complete hysterectomy routine. A small rubber tissue drain was inserted into the vagina and the vaginal stump closed. All clamped pedicles were ligated and brought to vaginal stump and made fast. The bladder peritoneum was then brought over the vaginal stump and sutured to the posterior surface, covering all raw surface with peritoneum. Abdomen was closed in routine manner.

The postoperative course was uneventful and the patient was discharged from the hospital, October 17, 1927, thirteen days after operation.

Subsequent Course.—Patient was advised to return to the hospital in six weeks for deep x-ray therapy to the pelvis but failed to do so. March 1, 1928, Social

Service Department located the patient and brought her to the Gynecological Out-patient Department. On pelvic examination I found the pelvis practically clear with no evidence of recurrent malignancy.

Pathologic Note.—Diagnosis: Sarcoma of the uterus arising in a myoma. Adenocarcinoma corporis uteri. Myoma uteri.

Gross Pathology.—Material consists of uterus and both tubes and both ovaries. The uterus is very irregular, about 9 cm. long with several subserous myomas, the largest being about 6 cm. in diameter. The uterine cavity contains a polypoid mass, very edematous. This mass arises from the endometrium of the uterine cavity at its uppermost portion with a broad base and almost fills the entire cavity; several small areas, about 1 cm. in diameter and raised, are noted along the lowermost portion of the uterine cavity. Suggests adenocarcinoma. (Fig. 1.)

Microscopic.—Section A shows a piece of cervix extending up to the uterine cavity. The epithelial covering is intact, but beneath it there is moderate round



Fig. 3.

celled infiltration. Section B shows a mass of myoma tissue pushing up under the endometrium. The latter has undergone definite malignant proliferation, and nests of uterine epithelium are growing back into the uterine wall in an infiltrating manner. (Fig. 2.) Section C shows more of this carcinomatous process, but at the same time in the myoma one sees a beginning proliferation of large spindle cells from the tissue about the blood vessels. These cells are large and have large deeply staining nuclei. The picture is that of sarcomatous change in a preexisting myoma. (Fig. 3.) Section D, taken from a myoma on top of the uterus, shows bundles of smooth muscle fiber arranged in whorls which interlace in every direction; in areas it is very cellular, although there is no evidence of malignancy. Also marked hyaline degeneration is present. (Fig. 4.)

The case may be briefly summarized as follows: Multiple myomas are present throughout the uterus and in one of these myomas a

sarcomatous change is noted; the uterine cavity is filled with a polypoid mass, resembling a bunch of grapes, which arises from the endometrium and is an adenocarcinoma of the fundus.

DISCUSSION

Cases of myoma, sarcoma, and carcinoma arising in the same uterus have been reported by Niebergall, Ivanoff, Rabl-Rueckhard, and Schaller. Cases of sarcoma and carcinoma in the same uterus have been described by Gebhard, Jaffe, Emanuel, von Franqué, Opitz, Amann, P. Findley, Lagreze, Moise, Nebesky, Otto Franqué, Oskar Frankl,

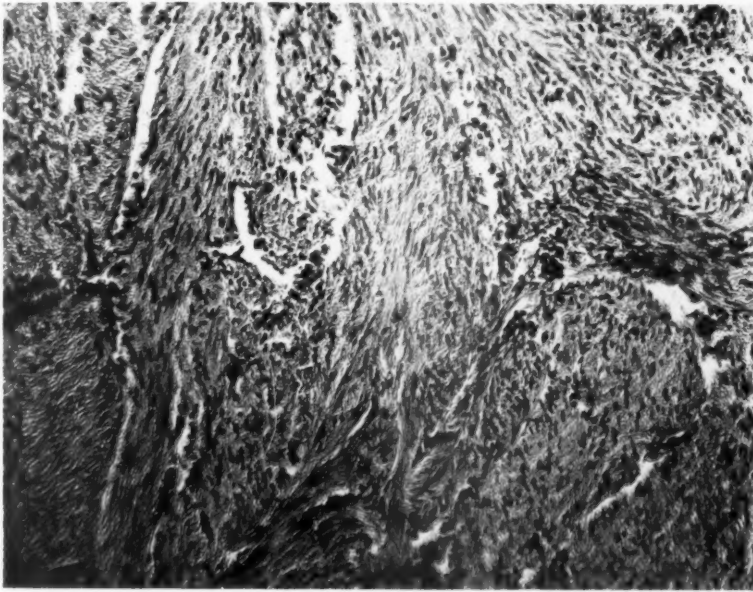


Fig. 4.

and Ballin. All of the authors have seen one case each, with the exception of O. Frankl who studied 8 cases. His cases are reported over a period of 15 $\frac{3}{4}$ years, and he treats with this condition in detail. In none of his cases was a myoma present. He states that it is possible for the same uterus to have both carcinoma and sarcoma. They may be closely approximated or distinctly apart. He has studied the pathology of these tumors very carefully and recognizes the fact that an accurate diagnosis is sometimes very difficult and urges that a definite terminology be used when describing these tumors. The term sarcoma plus carcinoma applies to separate tumors, carcinosarcoma to mixed tumors in which sarcoma and carcinoma are intimately mixed, and carcinoma sarcomatodes to a carcinoma which has characteristics of growth of sarcoma.

Virchow referred to these tumors under the name carcinoma sarcomatodes, believing they were true mixed tumors in which both epithelium and connective tissue were represented in the neoplastic growth. Certain pathologists uphold Virchow's description while others claim that these cases are instances of two separate growths arising independently in the same organ.

Herxheimer, in discussing the pathology of sarcoma and carcinoma in the same uterus, suggests three possibilities: (a) that a carcinoma and sarcoma may develop simultaneously as the result of the same cause acting on different tissues; (b) that the atypical proliferation of epithelium on the base of a preexisting sarcoma may lead to the development of a carcinoma within a sarcoma, and (c) that the stroma of a carcinoma may undergo a sarcomatous change.

Ewing, in treating with the pathology of sarcoma and carcinoma in the same uterus, suggests the following: (a) the simultaneous occurrence of two separate tumors which may invade one another; (b) the development of carcinoma at the point where a submucous or mural sarcoma meets the epithelial layer, and (c) carcinomatous changes in the glands of a sarcomatous or inflammatory polyp.

Claessen and Mathias, in reviewing the subject of carcinosarcoma occurring in the same organ, have collected 72 cases which they accept as authentic, viz., uterus 20 cases; breast 15; ovary 12; thyroid 7; esophagus 4; stomach, liver, lungs, kidney, 2 each; gall bladder, pancreas, pharynx, tube, prostate, nose, 1 each.

Most of the cases reported in literature were adenocarcinomas of the body and cervix, and sarcomas arising from either the endometrium or myometrium and not sarcomas arising in a myoma. One can readily see how difficult it is to make an accurate diagnosis when the two malignancies spring from the interior of the uterine cavity and encroach upon each other in such a way that the cells often lose their characteristics. It is not so difficult in the case reported herewith, where all three tumors are separated from each other. The carcinoma is of the adeno type situated high up in the body of the uterus, the sarcoma arising in a myoma lying in the wall of the uterus.

The author wishes to take this opportunity to express his indebtedness to Dr. I. Y. Oleh, Department of Surgery, for the pathologic report.

411 WALL BUILDING.

EPISIOTOMY WITH MODIFIED OPERATIVE TECHNIC*

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WE THINK of a woman in confinement as undergoing a normal, physiologic process and expect that nature will care for her functions without interference. Unfortunately our assumption is not always founded on fact. The birth of the first child is an event of vital importance, for complications may occur at this period which sometimes threaten life and very often permanently impair health.

Almost every primipara suffers some perineal laceration. Sometimes the tear is obvious but of minor degree. In these cases repair can be effected very easily and satisfactorily. Frequently the tear is extensive and the effort at repair results only in a partial restoration of the normal anatomic relations. Sometimes the lacerations are submucous and escape detection. In either of the two latter conditions, the basis is laid for years of suffering and ill health. The gynecologist can best estimate the penalty that women pay because of the lack of skill of the average physicians who attend them in confinement. Rectocele with chronic constipation, cystocele with persistent cystitis, prolapse of the pelvic organs with their attendant major and minor discomforts, and numerous other complications can usually be traced directly to the first labor which did not follow an entirely normal physiologic course.

It is not the purpose of this paper to discuss those conditions which give rise to the various complications. Whether the child's head is too large, the soft tissues of the perineal floor too inelastic or labor pains too violent, the results are the same. The perineum gives way in the line of least resistance, the ultimate result being frequently one or more of the pathologic conditions above mentioned. Physicians have recognized this fact for ages. Hippocrates tried to prevent perineal lacerations by the application of oily salves and relaxing douches and, even to this day, the same attempt is made by some by the application of hot fomentations and by supporting the perineum with sponges during the moments of greatest stress. In the seventeenth century Van Horn tried to obviate the complications by manual dilatation with forcible pushing back of the coccyx. This method is still used by some.

Considering the strides made in surgery within the past generation it is remarkable that so little attention has been given to certain obvious and logical surgical procedures which will prevent the com-

*Read at the Meeting of the California Northern District Medical Society, Woodland, April 10, 1928.

plications incident to confinement. Episiotomy is not a recent procedure. As far back as 1742, Ould cut the vulvar outlet when it offered too great a resistance to the escape of the head. In 1810 Michaelis used the episiotomy, considering a surgical incision, even in those days when there was no aseptic technic of less consequence than an uncontrolled tear. Ritgen and Schultze made numerous small



Fig. 1.—Line of incision midway between anus and tuberosity of ischium.

incisions in the tense vulvar ring. Sponzoni recommended two lateral incisions, Crede, one, directed from the frenulum toward the tuberosity.

From the time of Ould it has been considered to make a clean incision to avoid a laceration of indeterminate extent. Yet how few men doing obstetrics as a part of their general practice are familiar with or employ this simple surgical procedure? Simple as it is, it will, in almost every instance, prevent the laceration which may render the patient a chronic invalid. When the tissues of the perineum begin to separate under stress it is impossible to know where the severance

will end. The laceration may extend into the rectum, or rupture the anal sphincter, which disaster will reflect on the competence of the physician. We believe that such an accident always can and should be prevented by an episiotomy.

The indications for an episiotomy are: (1) A resistant perineum, causing delay in the passing of the head through the vulva. (2)

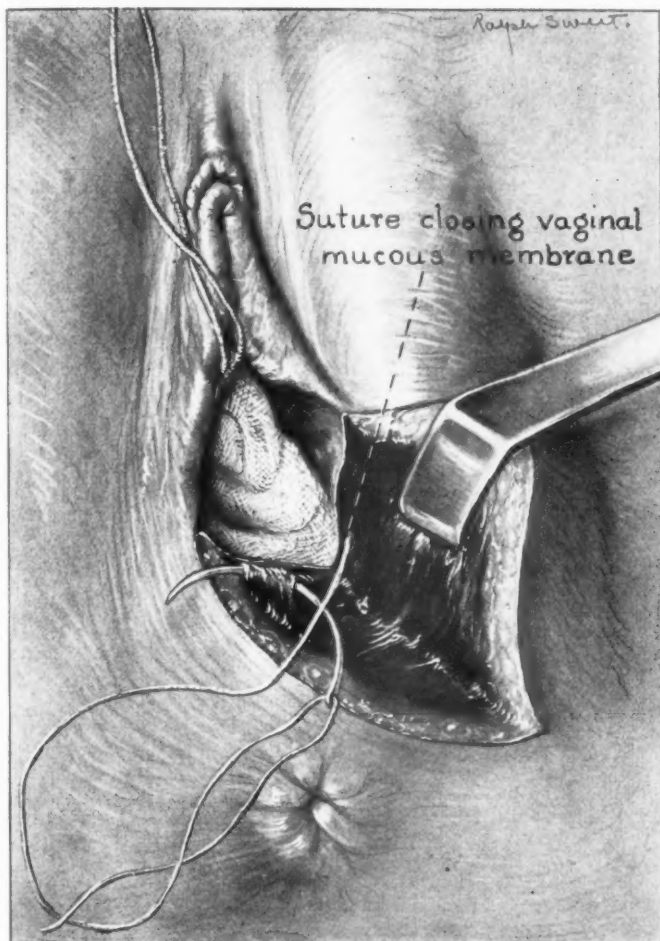


Fig. 2.—Wound retracted showing location of knot and suture in submucous tissue at upper angle of vaginal wound.

Syphilis. (3) Scars. (4) Anomalies of the vulva. (5) Abnormal size of the child. (6) Abnormal mechanism. (7) Disproportion between the size of the outlet and the head. (8) The necessity for rapid extraction when one cannot give the perineum time to dilate. (9) Beginning laceration.

There are three types of episiotomy: (1) The lateral or bilateral;

(2) the median, where the line lies in the raphe; (3) the mediolateral, recommended by Tarnier and practiced by DeLee.

The episiotomy may be simple or deep. In the simple procedure the

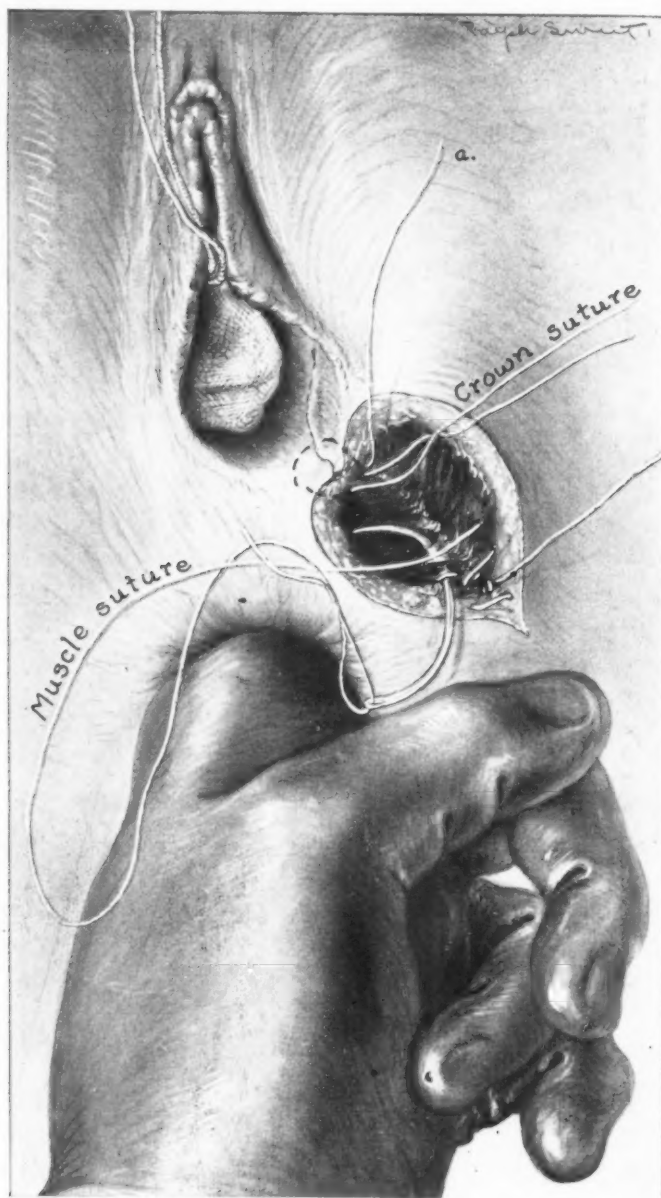


Fig. 3.—Mucous membrane closed. (a) Long end of suture left to tie with muscle suture; (b) crown suture completed and laid aside; (c) deep suture with long end left at lower end of wound.

following structures are cut: skin, urogenital septum, constrictor cunni and transversus perinei, and a few of the anterior fibers of the

puborectal portion of the levator ani. In the deep episiotomy, as recommended by Dührssen, the incision goes through the levator ani into the ischiorectal fossa, thus making an extensive operation. We are using the simple episiotomy as practiced by Tarnier and DeLee, because of the fact that there is less danger of an extension of the

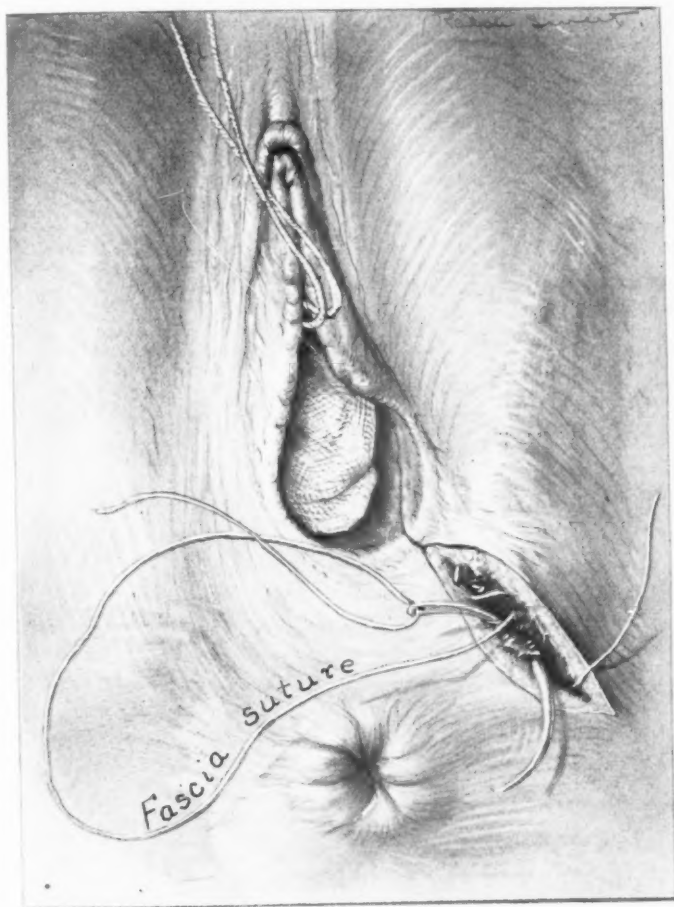


Fig. 4.—Deep tissues closed. (a) Knots tied to vaginal suture; (b) crown sutures tied with knots cut closely; (c) fascia suture beginning beneath and returning through opposite side to starting point and tied, continues to lower end of wound and ties to end of muscle suture.

wound. Another advantage is that the incision heals more readily because of the greater amount of muscular tissue.

It is well to wait until the levator ani muscles have been moderately stretched, as shown by the opening of the anus and the dislocation of the anus downward and forward, and only the resistance of the vulvar outlet remains to be overcome.

One blade of the scissors is placed on the vaginal mucous membrane, the other on the skin of the perineal body, midway between the anus

and tuberosity of the ischium, the cutting angle being at the raphe. With two fingers in the vagina and thumb on the skin, the sphincter is pressed out of the bite of the scissors. By a single closure of the scissor blades all of the intervening tissues are severed. Hemorrhage

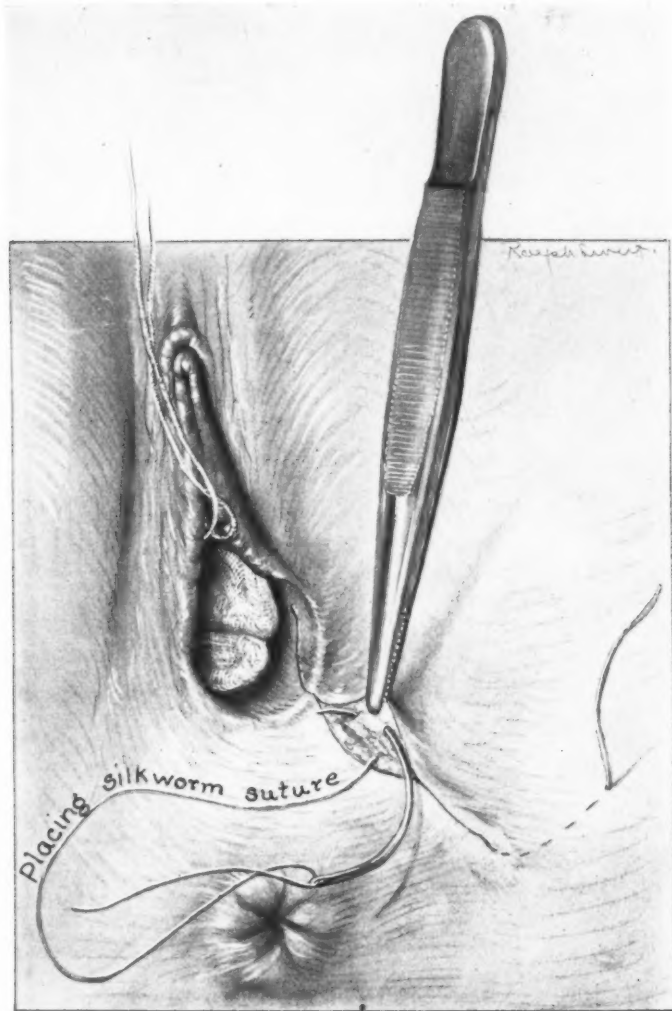


Fig. 5.—Closing skin with subcutaneous silkworm gut.

can be controlled by pressure and ceases entirely after the head has been delivered.

We now have a straight clean incision and can easily replace all structures in their correct anatomic relations.

With our early episiotomies some trouble was experienced from infection causing imperfect results. Observation led to the conclusion

that this contamination was due to infection following the sutures from the surface, at which points they were tied to the deeper structures. To obviate this objection the technic was modified, resulting in the method to be described. Since this modification, union by primary intention has always occurred and, after complete resolution, it is difficult to recognize one of these perineums as that of a woman who has borne a child.

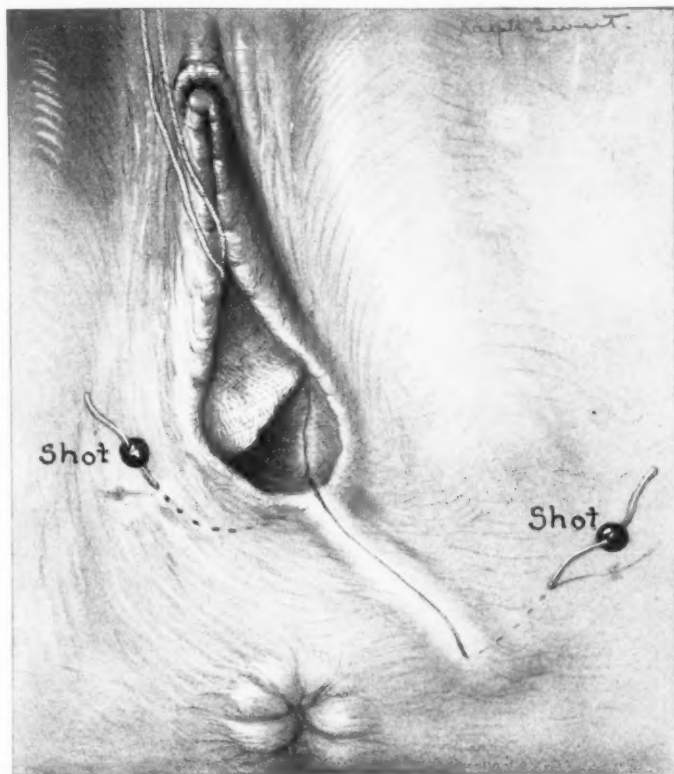


Fig. 6.—Wound closed with but two stitch holes in skin, but out of line of vaginal discharges.

Operation.—With the incision made as described, the repair is accomplished in the following manner:

1. Begin the catgut suture at the angle of the incision in the vagina, the bite including the submucous tissue only. Tie a knot underneath and use a continuous suture, taking great care not to puncture the mucous membrane. When the vaginal wound is closed with proper approximation of the tissues at the vaginal orifice, direct the suture down to the muscular tissue in the wound. Apply a clamp to the free end of the suture and leave it long enough to tie to the suture used to close the muscular layer.

2. Enter the crown suture beneath the fascia, passing upward and through it to the skin at the edge of the wound. By deep bites gather up the fibers of the constrictor cunnis and of the urogenital septum, the suture approximating the

corresponding structures on either side of the wound, but not puncturing the vaginal wall. The ends of this suture are clamped and laid aside until the muscle suture is completed and tied. Then it is tied and cut closely, the knot being later covered with fascia.

3. The index finger of the left hand should be in the rectum to determine the depth of the next suture. The deep suture should be started at the lower end of the wound. Tie the knot, leaving a long end to unite with the fascial suture. This should be a continuous suture, taking all of the severed tissues below the fascia, and going close to the rectal mucosa. When this suture is made tense, it approximates all of the muscular tissues. It should be tied to the long end of the vaginal suture and the ends cut closely.

4. The suture closing the fascia should begin at the upper end of the incision, starting under the fascia. It is brought through and over the fascia to the other side with the point of exit under the fascia near the point of entry and tied, drawing the fascia over the knot. This suture is continuous to the lower end of the wound. The end brought out beneath the fascia is tied to the muscle suture with the knot cut close. Thus we have mucous membrane, muscles, and fascia closed deeply, covering all sutures and knots.

5. The skin is closed with subcutaneous silkworm gut, the point of entrance being about one inch from the side of the wound, running to the lower end of the wound and making a subcutaneous suture to the vaginal orifice, then running beneath the skin to a point of exit about one inch upward and to the side of the vulva. The suture is pulled tight approximating the skin. A shot is put on each end about three-fourths of an inch from the skin. Thus the wound is closed with but two stitch holes in the skin and those are out of the line of vaginal discharge, thereby minimizing the probability of infection.

The wound should be healed in ten days, and there is but a single subcutaneous suture to remove. In six weeks all tissues will be as firmly united as before labor began.

For the past two years we have used this method of episiotomy and repair for almost every primipara. We have had no infections.

WOODLAND CLINIC.

RHYTHMIC VARIATIONS IN THE VASCULARITY OF THE UTERUS OF THE GUINEA PIG DURING THE ESTROUS CYCLE*

BY J. E. MARKEE, B.S., CHICAGO, ILL.

THE vascularity of the uterus of the guinea pig undergoes cyclic variations that make it appear to blush and blanch. Both the speed and the extent of these vascular changes are affected by the time of day and the stage of the estrous cycle. We have been unable to find similar vascular changes in any other tissue, either in situ or in transplants to the anterior chamber of the eye, of pancreas, islands of Langerhans, vas deferens, heart muscle, or liver.

These vascular changes were studied by three methods: First, by opening the abdominal cavity and studying the gross and microscopic changes in the uterus in situ; second, by transplanting a piece of endometrium to the anterior chamber of the eye by the method described by Dr. S. S. Schochet in *Surgery, Gynecology and Obstetrics*, in 1920, and third, by inserting a small tube through the vagina and half way up the horn of the uterus and observing the changes in the endometrium through that tube.

By the first method, namely, opening the abdominal cavity of an anesthetized guinea pig, we found that the whole uterus was red most of the time. About every minute a light area appeared at the upper end of the horns and spread down them toward the cervix. The whole uterus was white for ten or fifteen seconds and then the region above the cervix became red and the red color spread up the horns of the uterus. These changes occurred about once a minute during the diestrus and much more slowly during estrus. We were unable to observe them in immature animals. It is possible to make much more detailed observations on endometrium transplanted to the anterior chamber of the eye. Figs. 1 and 2 represent the two phases of an endometrial transplant in the anterior chamber of the eye of a guinea pig. The former represents the condition when the transplant is white; the latter the condition fifteen seconds later when it is red. By comparison with a Tallqvist hemoglobinometer we found that the two colors were comparable with the colors indicated by 0 and 50 per cent hemoglobin respectively.

We made twenty-minute records every two hours for three complete estrous cycles of sixteen days each. Two of the records were made on

*Read at a meeting of the Chicago Gynecological Society, April 20, 1928.

This research was conducted under a grant from the Douglas Smith Foundation for Medical Research of the University of Chicago.

one animal and one on another. Kymograph records were made of the color changes by means of a graduated dial and a muscle lever.

The first group of kymograph records illustrates the four typical phases of the vascular reaction seen every day of the estrous cycle except during estrus. The first record was taken in the early morning. The vascular changes occurred about every twenty seconds; the average color corresponded to 25 per cent hemoglobin and the transplant was completely blanched or white about 6 per cent of the total time. In the forenoon both the speed and the extent of the reactions are increased. At this time they recur about every fifteen seconds; the average color of the transplant is comparable to 30 to 35 per cent hemoglobin, and it is completely blanched about 10 per cent of the total time. From noon until 3 P.M. the speed and especially the extent of the vascular changes are greatly decreased. They recur about every eighteen or nineteen seconds. The time in complete blanch is less than 10 per cent of the total time, and the average color corresponds to 25 per cent hemoglobin. The height of the vascular



Fig. 1.



Fig. 2.

activity is reached in the late evening from about 8:00 until 11:30 P.M. The vascular cycles recur about every twelve or thirteen seconds. The amount of time in complete blanch is more than 12 per cent, and the average color is comparable to 35 per cent hemoglobin. These four phases—the lowest activity in the early morning, an increase in the forenoon, a slight decrease about noon and the height of the activity in the evening—are found throughout the cycle except during estrus. (Fig. 3.)

The second group of kymograph records (Fig. 4) illustrates the effect of estrus on these vascular changes. The first record illustrates the condition during proestrus. Two hours before this record was taken the vascular changes were recurring every thirteen seconds and the transplant was completely blanched 16 per cent of the total time. When this record was taken, the changes were recurring every twenty seconds, and the amount of time in complete blanch had dropped to about 8 per cent. There was a decrease of about 40 per cent in the vascular activity of the transplant during this two-hour period. At this time of day there would normally have been an increase. The

second record illustrates the condition during much of the estrus. This animal was in estrus, as determined by the vaginal smears and other methods, from 2 until 7 A.M. There were no vascular changes that compared in extent with those found at all other times in the estrous cycle. The color of the transplant for this five-hour period remained around 25 per cent, neither falling much below 20 per cent nor rising much above 35 per cent.

The third record illustrates the condition during postestrus. The vascular cycles reappear at this time, and there is a very rapid return to the condition found during the diestrum. However, the long plateaus at about 40 per cent hemoglobin are typical of this stage. The last record illustrates the height of activity reached during the dies-

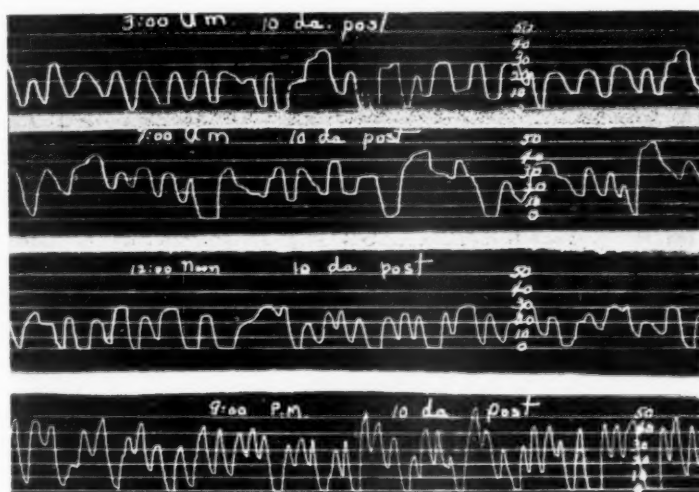


FIG. 3.

trum when the vascular reactions sometimes recur every twelve seconds; the average color of the transplant is above that of 35 per cent hemoglobin, and the transplant is completely blanched 16 per cent of the total time.

The small blood vessels in the transplant alone could be observed through a microscope and they appeared and disappeared about every fifteen seconds, while the blood vessels leading to the transplant as well as all the other visible vessels in the eye remained unchanged.

We have been unable to observe this phenomenon in well-vascularized transplants of uteri in immature animals.

By inserting a speculum 4 mm. in diameter through the vagina and half way up the horn of the uterus, we were able to confirm these findings in unanesthetized animals, since we found that the endometrium changed from red to white and back again every fifteen or twenty seconds during the diestrum but not during estrus.

These vascular changes seem to be a specific property of the uterus, for although we have observed them there by the three methods described, we have been unable to observe similar vascular changes either in any other tissue in situ or in transplants to the anterior chamber of the eye, of pancreas, islands of Langerhans, vas deferens, heart muscle or liver.

The facts briefly summarized are: These vascular changes are influenced by the time of day, being at their lowest ebb in the early morning, increasing both in speed and in extent in the forenoon, decreasing again about noon, and reaching their height late in the evening. They are also influenced by the stage of the estrous cycle, slowing during proestrus until they disappear completely for four or five hours, and then begin to reappear before the end of the period of heat.

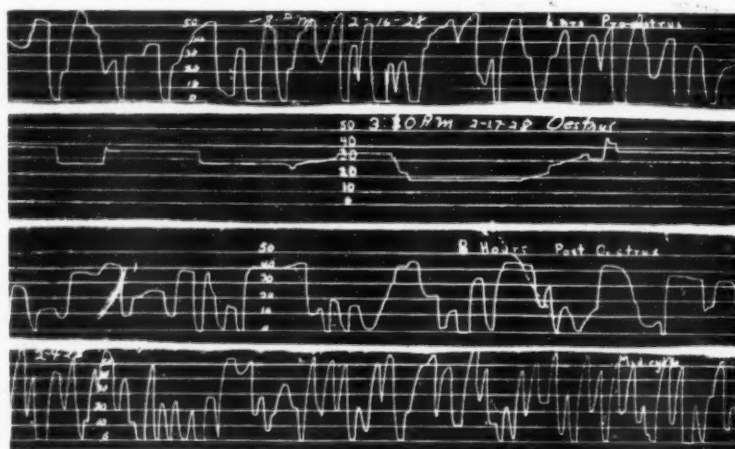


Fig. 4.

These gross changes are caused by great variations in the amount of blood in the capillaries and arterioles.

From these facts we conclude that these vascular changes are a phenomenon of the capillaries and arterioles of the uterus and especially of the mucous membrane.

The vaginal smear method as a test of the efficiency of the follicular hormones and other similar pharmacologic agents is based primarily on the changes in the vaginal epithelium. These changes are simply the expression of rapid growth and may be called forth by agents other than follicular hormones, some of which do not affect the uterus and ovaries. An attempt, therefore, to determine the applicability of this phenomenon as a criterion of the uterine efficiency of the sex hormones and other similar pharmacologic agents is now under way.

(For discussion, see page 268.)

THE PROGRESS OF TEACHING AND PRACTICE IN GYNECOLOGY DURING THE LAST FOUR DECADES*

BY BARTON COOKE HIRST, M.D., PHILADELPHIA, PA.

THE review of the progress of teaching and practice in gynecology during the last four decades is a large task. To survey all the achievements of this period in any branch of medicine would require years of work by a medical historian. My only qualification is to have lived in this era, and as an humble follower of William Osler in his advocacy of the peripatetic philosophy in medicine, not to have been blind to what I have seen.

It is not my intention to dwell on the lamentable ignorance of the past in the light of the present knowledge, a trait of the human mind older than Cicero, who commented on the wonder of each generation that its predecessor could be ignorant of what is so evident; a mental state conducive to a smug complacency with the present, but inimical to future progress. A more profitable undertaking is to contribute, no matter how little, to a future that shall be as superior to the present as the present is to the past.

In the latter spirit a retrospect of teaching and practice in this locality, a survey of the present and a glimpse into the future, might point the way to some of the improvements for which we should hope.

A description of practice and teaching forty years ago is familiar enough to men of my generation but it must sound strange to younger men. The women who went to hospitals for delivery were usually paupers and the illegitimately pregnant. There were few places for them to go. In this city (Philadelphia), Blockley, the Preston Retreat, the Lying-in Hospital, and the Maternity Hospital comprised the list; all small, none of them frequented by the well-to-do; in fact, a stigma attached to residence in them. Consequently, the delivery of a woman, a surgical procedure, was always conducted in her own home; difficult enough to do now with all our knowledge of asepsis and our transportable operative equipment, but doubly difficult then with the hazy notions about infection prevalent in the early antiseptic era and lack of equipment. High forceps operations were common; failing in that, version was the next procedure tried, with little regard to the relative size of head and pelvis, often with disastrous results. These operations were done with the patient on her bed, with no assistants. Cesarean section was such a rarity that throngs of spectators rushed to see it in a public clinic and it was considered so dangerous that patients were offered the choice between craniotomy on the living child and the

*Read before the Obstetrical Society of Philadelphia, December 1, 1927.

cesarean operation in cases of insuperably contracted pelvis. For this was the only indication for the operation in those days; no one considered its employment in placenta previa, toxemia and the other indications of today. The accepted technic of a cesarean section here at that time was of an incredible crudity; a huge abdominal incision; the eventration of the unopened uterus, its evacuation, the transfixion of the lower uterine segment with a couple of skewers, the ligation en masse of the cervix and broad ligaments by a rubber tube, the amputation of the corpus uteri and the fixation of the stump, as large as one's wrist, in the lower angle of the abdominal wound, to slough away in the course of five or six weeks, invariably leaving a large incisional hernia if the woman survived the operation itself or the sepsis and secondary hemorrhage that frequently carried her off during convalescence. It was Baer, of this city and of this Society, who taught us to drop the cervical stump after hysterectomy, an important historical fact that should be remembered. We knew nothing of leucocytosis, differential blood counts, blood cultures, blood chemistry, the sedimentation test and blood pressure; nothing of hypercholesterolemia, responsible for the gall bladder complications of pregnancy; nothing of functional tests for kidneys and liver; of pyelitis, of the Wassermann reaction; of the intravenous treatment of syphilis, and of gestational toxemias. We did not yet possess the primitive cystoscope over the credit for which Kelly and Pawlik wrangled later. Endocrinology was as yet unborn. Bacteriology was in its infancy and was not utilized in diagnosis or treatment. Early gestational toxemia was a neurosis and late gestational toxemia, nephritis. Appendicitis was perityphilitis, treated by poultices and opium. Salpingitis was parametritis, treated by iodine to the vaginal vault and tampons. I heard the late Professor Goodell, in a meeting of this Society, say that he never saw a pus tube and that he did not believe there was such a thing. We knew nothing of the refinements of aseptic technic in pelvic examinations and manipulations, with which we are now familiar. We knew none of the methods of precision in the diagnosis of pregnancy, none of the specific treatments for blood infections. We had no radium or x-rays. Antisepsis, in gynecic surgery, if attempted at all was Listerism with its carbolic spray and occlusive dressings to exclude the air. For disinfection of the birth canal, corrosive sublimate was the remedy. Cleansing of the hands was neglected and rubber gloves were unknown. When I went to my professor of clinical surgery in great distress of mind about the dreadful infections in the surgical ward of the University Hospital, I was told that I had no more to do with them than I had with the next thunderstorm above the city; that these infections all came from the air; so I continued with a clear conscience to infect everything I touched and to shovel out of

the bran dressings of open wounds live maggots that had bred overnight.

If a young physician were suddenly thrust backward forty years, one of his strangest experiences would be to miss so many names with which we are familiar in our branch of medicine. There was no Stroganoff to systematize the use of morphia in eclampsia; no Watkins to show us how to cure a cystocele; no Wertheim to teach us how to do a panhysterectomy for cancer; no Potter to improve the technic of version and to enlarge its indications; no Rubin's test for patency of the tubes; no Titus or Thalheimer to demonstrate the advantages of the intravenous treatment of the toxemia of pregnancy with glucose and insulin; no Kielland, Barton or Piper with their new models of forceps.

So much for a brief review of the practice of the day that was necessarily a reflection of the teaching of the time. To enter the medical school a page of English composition was required, nothing more. The farmer's boy could drop his plough, the conductor leave the platform of his street car, the mechanic desert his trade and enter a medical school. No wonder the manners of our medical students were not exactly Chesterfieldian. Our medical course had recently been increased to three years. The last two years we heard the same lectures repeated. The course ended, as I remember, somewhere about the middle of February, and we graduated in March. For the care of women and their infants in childbirth, the most responsible duty demanded of a young physician, we had no training at all; nothing but didactic lectures, inimitable, it is true, as given by Professor Penrose, but entirely inadequate to fit anyone for the emergencies of that branch of medicine.

It was in Europe, eighteen months after my graduation, that I first took care of a woman in labor. It was the first day of my internship in the Royal Frauen Klinik in Munich. I was demonstrating the management of labor to German medical students, many of whom had a greater experience than I, and the head nurse serving under my direction had, as a midwife, delivered eight thousand women.

In what is carelessly and incorrectly called gynecology our instruction was better. We watched Goodell operate both in large clinics, in which we saw practically nothing, and in small ward classes, in which we saw plastic operations, such as they were, and were given an opportunity to make a few vaginal examinations. The effect of our theoretical teaching, mainly by lectures, was illustrated by an incident of which Goodell told me privately. A young graduate called on him one day to ask him how he removed ovaries, many women being spayed in those days for indications that would not now be justifiable. Goodell good naturedly described the technic of oophorectomy, but then in alarm said, "You do not propose to operate on this verbal descrip-

tion?" "Oh, yes, I do," replied the young man. Meeting him some time later Goodell asked how the operation had prospered. "I did exactly as you told me, but unfortunately forgot one step in the technique. I neglected to ligate the blood vessels."

And here let me digress for a moment by an incursion into etymology, to explain a recent phrase in this manuscript about the careless and incorrect use of the word gynecology, and to point out the disadvantages we labor under in maintaining a provincialism in teaching, study, and practice of this subject, commented upon with surprise and evident disapproval by every foreign visitor. In response to Juliet's query, "What's in a name?" a physician might answer, there may be life and death in it; there may be clear thinking or mental confusion; there may be progress or retrogression in it. Hundreds of lives have been lost in consequence of the careless use of the word curettage to denote the instrumental evacuation of the uterus after childbirth or abortion. Gynecology means the study of everything peculiar to women, whose sole biologic purpose in life is reproduction. The chief item in this study therefore must be the act of reproduction with all its consequences, anomalies and complications, which include all the diseases of women. To usurp this term gynecology, therefore, for a minor branch of the subject, mere gynecopathy, is to give the latter undue importance and to confuse both the professional and lay mind. If gynecology were only gynecopathy, the surgeon's taunt that such a specialty is unnecessary, would be justified. Why not agree on a correct nomenclature, not a fanciful *lucus a non lucendo*, but the clear expression of a true idea? Gynecology includes its major subject, genematology, the science of reproduction, and its minor subject, gynecopathy, the study of the diseases which are the results or the complications of childbearing. Neither one of the two branches of gynecology can be studied, taught or practiced successfully without the closest correlation with the other. Of this, however, more later.

Now as to our comparative position in those early days. In comparison with Europe we were woefully deficient. Any one going from our medical schools to the best of those in Europe was astonished and humiliated. The instruction of medical students was then better there in some ways than it is here now. The primitive conditions here however were not surprising. We were only some two hundred years removed from the log cabin stage of civilization and many parts of the country were just emerging from it. Europe had the start of us by more than a thousand years. The marvel of it is that in a generation we have attained in some respects an equality with Europe, in a few, even a superiority.

In contrast with other parts of this country our position needed no apology. The Medical Faculty of the University of Pennsylvania forty years ago was the strongest in its history, composed of really

great figures in our medical world. The medical education, poor as it was, was the best to be had in America. The Medical School here was at the peak of its reputation and influence. Pepper, Agnew, Goodell, Wormley, Ashurst, Leidy and their colleagues were keenly aware of the restrictions imposed upon them by lack of equipment, poverty of means, the impracticability of advancing faster than the country would follow. The great mind of William Pepper, without an equal in this city, I think, since the days of Franklin, had the vision and the compelling energy to lay the foundation of the advantages we enjoy today.

What now of our present and of the immediate future? We tread here on delicate ground.

For many years this city had the unchallenged hegemony in the teaching of "gynecatology," to be consistent in the etymologic reform just advocated. Shippen, James, Dewees, Hodge and Meigs were without rivals in their time. But this very supremacy engendered too great a confidence in what appeared to be an unassailable position. Shippen, in 1765, founded the first maternity hospital in North America for the practical instruction of medical students. James conducted classes in the Philadelphia Hospital, but their successors became more and more indifferent to the necessity of practical training so that many years had elapsed before the induction of the last incumbent of the chair, without a bed or a patient; with no training in that branch of medicine that is as much if not more of an art than any other and is unsurpassed by any other in its importance to the individual, the family, and the State. Meanwhile, other places had awakened to the defects of our medical education. New York was given the Sloane Maternity for the instruction of the students of the College of Physicians and Surgeons. Boston had its Lying-in Hospital for the Harvard students. Baltimore had its Woman's Hospital for medical students. There may have been other institutions of the same kind elsewhere of which I am not aware. The University of Pennsylvania had its first beginning of a maternity hospital in a ridiculously inadequate little pavilion with five beds, which the professor at that time had to pay for out of his own pocket. This was thirty-eight years ago. Since then, throughout the country, the progress has been prodigious, a progress in which we have shared to a modest degree. Let the facts speak for themselves: Montreal has a unit for gynecology, that is, a woman's hospital for both the major and minor branches of the subject, under one head, with two hundred and forty beds, erected at a cost of \$1,600,000. Columbia University is incorporating the Sloane Hospital for Women in that stupendous mass of buildings on the banks of the Hudson in New York City. This institution is also organized on modern principles, accepted now almost everywhere in this country as they always have been in Europe. Announcement has just been made of a new medical center in New

York City on the East River, next to the Rockefeller Institute, for which millions of dollars are promised. A rival to the Sloane Hospital will unquestionably be incorporated in these buildings. Professor Bill of Cleveland is at the head of a Woman's Hospital in that city. Professor Peterson of Ann Arbor is recently housed in a similar unit. Professor Polak of Brooklyn has ample accommodations for teaching both branches of gynecology. The Johns Hopkins Woman's Hospital has been in operation for some years. Chicago had set aside a city block across the street from its new medical buildings for a Woman's Hospital under one head. Even smaller cities, with no medical schools, are building splendid maternities. There is a new Maternity Hospital in Providence, R. I., costing over \$900,000.

To be classed in the first rank today a medical center must have an equipment second to none in buildings, organization and clinical material; a balanced state of mind in the directorate, supple enough to keep abreast of modern medical progress, keen enough not to chase the *ignis fatuus* of some vagary masquerading as progress, and above all without a reactionary tendency that balks at advancement because it is an innovation.

These few remarks on local medical history, our present position and future prospects may sound pessimistic. They are not meant to be. No one could know the younger generation to whom we hand the torch of medical enlightenment and progress, without confidence that they will have a wider vision, greater attainment than ours. That these thoughts were prompted by discontent is true, a feeling with which I would imbue all here; not the discontent ending in captious criticism, but the "divine discontent" of which Charles Kingsley spoke that incites one to greater accomplishment.

In conclusion a word about our venerable Society, without which a history of the last four decades of gynecology in Philadelphia would be incomplete indeed. Founded at a meeting in June, 1868, it numbered among its original members such names as Robert Harris, Albert H. Smith, George Pepper, Ellwood Wilson, Wallace, D. Hayes Agnew, Duer and Parry.

The famous debate between Goodell and Ellwood Wilson on the relative merits of version and forceps; Goodell's paper on concealed accidental hemorrhage of the gravid uterus, the basis of all subsequent study of the subject; his description of chorea complicating pregnancy; the fiery onslaught of Joseph Price on some of the mistaken practices and beliefs of his day turned the eyes of the whole profession toward our meetings. I wish we could claim the honor of incorporating in our transactions Goodell's sketch of Louyse Bourgois, a literary gem of the first water; the most charming bit of English ever written by an American physician with its exuberant wit and rollicking humor, its facility and originality of expression, its profound knowledge

of history and literature. But we must relinquish this distinction to the County Medical Society.

If the transactions of late years do not command the attention they once did it is because, in the absence of revolutionary changes or discoveries that are not likely today or in the near future, we have perhaps busied ourself with minor details and none of us have the pioneer's enthusiasm of our predecessors. But much remains to be done in literary, clinical, and laboratory research, in animal experimentation, in the careful correlation of known facts, in compiling statistics according to a well-considered, generally accepted plan and in the study of comparative genematology.

If we possessed a center for this work at least the equal of anything of its kind in America, and equally well organized, there would be a stimulus to investigation by which our society would again become the vehicle for conveying information of great value to the whole medical world, giving to its transactions a rank commensurate with its past reputation.

POSTPARTUM BLADDER COMPLICATIONS

BY GEORGE C. PRATHER, M.D., BOSTON, MASS.

THE postpartum bladder occasionally shows the effects of the efforts and accomplishments of the uterus. It has been acutely compressed during late pregnancy; its attachments have been markedly stretched by uterine enlargement. Recovery from such rough handling sometimes takes longer than what we consider as normal. Such cases form our group of postpartum bladder complications.

The conditions which primarily concern us are (1) acute retention of urine, and (2) bladder residual in those who are voiding apparently normally. Bladder residual urine is determined by catheterization immediately after the patient voids, measuring the amount of urine obtained. Acute retention is self-evident. Acute cystitis may accompany either of the two conditions just mentioned. It will also be discussed.

Recognition of such complications as well as the admission of the possibility of occasionally overlooking such conditions was admirably stated by Chamberlain¹ in 1877. He said, "This form of cystitis is very common * * *. I believe I have often overlooked it, confounding its subjective symptoms with afterpains, its tender hypogastric tumor with a sensitive uterus, its turbid urine with urine contaminated by lochial admixture or vaginal secretions. Rarely is there a painless hyperdistention of the bladder to such an extent that we might suppose meteorism was present, did not the fluctuating tumor

soft but dull on percussion, and the *stillecidum urinae*, but especially the catheter readily conduct us to the true diagnosis."

As Chamberlain wrote fifty years ago, so today postpartum bladder complications are occasionally overlooked. Cases of unexplained puerperal temperatures, cases which are diagnosed questionable pelvic sepsis, will frequently be found carrying a bladder residual which is definitely responsible for the fever. It is this group especially which has been interesting from the standpoint of diagnosis and treatment.

The study upon which this paper is based includes 58 postpartum cases from the Urological Service of the Boston Lying-In Hospital, observed during the years 1925, 1926, and 1927, which required treatment of the bladder for two or more consecutive days.

Fifty-eight cases comprise 1.1 per cent of the number of deliveries at the hospital during that period. Of these 58 patients, 87.6 per cent were primiparae. A history of previous trouble with the urinary tract was obtained in only 6.9 per cent. The average length of labor was twenty and a half hours. The types of delivery were given as follows:

Normal	9	15.52 per cent
Low Forceps	24	41.39 "
Mid Forceps	9	15.52 "
High Forceps	4	6.89 "
Breech	5	8.62 "
Internal Podalic Version	4	6.89 "
Cesarean	3	5.15 "
	<hr/> 58	<hr/> 100.00 per cent

Perineal tears were listed as follows:

No tear	13	22.42 per cent
First degree	13	22.42 "
Episiotomy or second degree	32	55.16 "
	<hr/> 58	<hr/> 100.00 per cent

From a study of the records, it does not seem likely that any one type of delivery is responsible for bladder complications, or that perineal lacerations play any part as causative factors.

ACUTE RETENTION

In a series of 157 puerperal cases, Taussig² found that 3.8 per cent required catheterization for acute retention. He quotes cystoscopic studies of acute retention bladders by Stoeckel and Ruge who found definite edema around the internal sphincter. Shutter³ quotes further studies by Ruge who concluded that postpartum bladder difficulties were in direct proportion to the amount and severity of injury to the bladder wall at delivery. Schmitz⁴ and others have found that during

pregnancy and the puerperium, the bladder has an increased capacity and is not as sensitive to a definite amount of urine or fluid as in the nonpregnant.

One seems justified from the facts known today in believing that no single factor is responsible for acute retention in these cases. Injury to the bladder wall from pressure or stretching of adjacent tissues, the paralyzing effect of the anesthesia, the increased bladder capacity, and the temporarily disturbed function of the nerves to the bladder as the result of delivery are probably the principal factors.

There are 39 cases of acute retention in this series, forming 67.24 per cent of the bladder complications. Data for this group are tabulated in Tables I, II, and III. The acute retention was relieved by catheterization. The smallest amount of urine obtained at initial catheterization was 10 ounces, the largest amount 69 ounces, or an average of 32 ounces.

Of these 39 cases with acute retention, 24 or 61 per cent had temperatures above 99° before catheterization was done, the highest being 101°. Of the 24 with temperature, 13 had had sediment examination of a catheter specimen, 9 of which were normal, 4 containing a moderate number to many W.B.C. Of the 14 cases of acute retention with normal temperature 9 cases had had examination of the urinary sediment, all of which were negative.

We may say that acute retention with rise in temperature before treatment may or may not show evidence of infection in the urinary sediment. In this group all cases of acute retention without rise in temperature before treatment had normal urinary sediments.

Two types of treatment were used in this series; namely, intermittent drainage, and constant drainage. In all these cases suprapubic and perineal heat, pituitrin or benzyl benzoate had failed to induce urination. The instillation of air, borated glycerin, and other mild irritants into the bladder have been employed by others without promising results in acute retention, and were not used in this series of cases.

Intermittent drainage was accomplished by catheterization every eight hours until the patient began voiding in satisfactory amounts. From that time catheterization for residual was done twice each twenty-four hours until the residual was found to be less than 1½ ounces. Catheterization was done aseptically and followed by a bladder irrigation with warm boric acid solution.

For constant drainage, a self-retaining catheter, size 18 or 20 F., was inserted into the bladder with a stylet. Bladder irrigations with warm boric acid solution were done once per day. Constant drainage was maintained usually until after the patient's temperature had been normal for twenty-four hours, and for a period sufficient for the bladder to regain its tone. Within twenty-four hours after the re-

TABLE I. ACUTE RETENTION. TREATMENT: INTERMITTENT DRAINAGE

CASE NO.	AMOUNT RESIDUAL OZ.	TEMPERATURE BEFORE TREATMENT	NUMBER OF DAYS OF TREATMENT	HIGHEST TEMPERATURE DURING TREATMENT	NUMBER DAYS		URINE SEDIMENT BEFORE TREATMENT	URINE SEDIMENT DURING TREATMENT	COMPLICATIONS
					TREATMENT BEFORE NORMAL TEMPERATURE	TEMPERATURE			
1	34425	45	1002	7	1008	6	?	many W.B.C.	none
2	37060	36	986	5	100	10	?	few W.B.C.	none
3	34692	10	1006	2	1004	4	?	?	none
4	34931	14	994	4	100	4	many W.B.C.	many W.B.C.	none
5	35794	61	100	5	101	7	?	many W.B.C.	none
6	38321	?	996	9	100	8	many W.B.C.	?	none
7	38376	?	995	7	1004	8	?	?	none
8	33362	?	97	14	1066	13	negative	many W.B.C.	none
9	33425	20	100	6	998	6	negative	negative	none
10	33714	?	994	7	998	10	negative	many W.B.C.	none
11	34484	50	99	5	996	5	?	?	none
12	38355	45	986	3	986	0	?	?	none
13	36730	42	100	4	1044	13	negative	many W.B.C.	Rt. pyelitis-clinically
14	36304	?	1006	2	1012	4	few W.B.C.	many W.B.C.	? pelvic sepsis
15	33438	?	998	9	1024	14	?	many W.B.C.	Sapremie uterine infection

Uncomplicated Cases: Average number days of treatment

5.33

Average number days before temperature normal

6.66

TABLE II. ACUTE RETENTION, TREATMENT: CONSTANT DRAINAGE

CASE NO.	AMOUNT RESIDUAL OZ.	TEMPERATURE BEFORE TREATMENT	NUMBER OF DAYS OF TREATMENT	HIGHEST TEMPERATURE DURING TREATMENT	NUMBER DAYS		URINE SEDIMENT BEFORE TREATMENT	URINE SEDIMENT DURING TREATMENT	COMPLICATIONS
					TREATMENT BEFORE NORMAL	TEMPERATURE			
1	35382	16	100	4	3	104	negative	many W.B.C.	none
2	37038	14	994	5	4	992	many W.B.C.	many W.B.C.	none
3	38086	18	992	4	4	1026	many W.B.C.	15 W.B.C.	none
4	38237	58	1006	4	11	1004	?	?	none
5	36578	16	986	10	10	1008	negative	many W.B.C.	none
6	37854	64	986	122	8	1002	negative	many W.B.C.	none
7	37961	?	986	153	13	1008	negative	many W.B.C.	Uterine sepsis

Uncomplicated Cases: Average number days of treatment

6.5

Average number days before temperature normal

6.66

TABLE III. ACUTE RETENTION, TREATMENT: INTERMITTENT AND CONSTANT DRAINAGE

CASE NO.	AMOUNT RESIDUAL OZ.	TEMPERA- TURE BEFORE TREAT- MENT		INTERMITTENT DRAINAGE		CONSTANT DRAINAGE		NUMBER DAYS		HIGHEST TEMPERA- TURE		TREAT- MENT BEFORE NORMAL TEMPERA- TURE	NUMBER DAYS	URINE SEDIMENT BEFORE TREATMENT	URINE SEDIMENT DURING TREATMENT	COMPLICATIONS
		NUMBER	DAYS	NUMBER	DAYS	NUMBER	DAYS	NUMBER	DAYS	HIGHEST	TEMPERA- TURE					
1 34758	64	98 ⁶	5	100 ⁸	5	99 ⁸	5	9	99 ⁸	negative	negative	9	9	negative	many W.B.C.	none
2 34846	27	101	4	101 ⁴	6	100 ⁴	6	7	100 ⁴	moderate no. W.B.C.	moderate no. W.B.C.	7	7	many W.B.C.	few W.B.C.	none
3 34991	?	100	5	101 ²	7	100 ²	7	10	100 ²	negative	negative	10	10	many W.B.C.	many W.B.C.	none
4 36562	62	100 ²	3	102 ⁶	2	99 ⁶	2	7	99 ⁶	negative	negative	7	7	many W.B.C.	many W.B.C.	none
5 36665	?	99 ²	3	100 ²	5	99 ⁶	5	5	99 ⁶	?	?	5	5	many W.B.C.	many W.B.C.	none
6 36794	42	98 ⁶	5	100	4	99 ⁶	4	6	99 ⁶	?	?	6	6	?	?	none
7 36811	?	101	3	100 ⁴	5	100 ²	5	7	100 ²	many W.B.C.	many W.B.C.	7	7	many W.B.C.	many W.B.C.	none
8 37461	50	98 ⁶	4	100 ⁸	10	99 ⁶	10	14	99 ⁶	?	?	14	14	many W.B.C.	many W.B.C.	none
9 37540	?	99 ²	4	98 ⁶	6	99 ⁴	6	10	99 ⁴	negative	negative	10	10	many W.B.C.	many W.B.C.	none
10 38194	22	?	2	98 ⁶	2	99 ⁶	2	4	99 ⁶	negative	negative	4	4	few W.B.C.	few W.B.C.	none
11 38202	10	99 ⁴	1	100 ⁴	7	101	7	10	101	?	?	10	10	?	?	none
12 38360	44	99 ⁴	1	99 ²	6	101 ⁴	6	8	101 ⁴	?	?	8	8	?	?	none
13 38638	69	99 ⁶	3	101	4	101	4	15	101	?	?	15	15	many W.B.C.	many W.B.C.	Bilateral pyelitis— clinically
14 33776	?	100 ⁴	7	104	5	105	5	28	105	?	?	28	28	many W.B.C.	many W.B.C.	Bilateral pyelitis— cystoscopically
15 34357	?	?	4	105	6	103	6	9	103	negative	negative	9	9	many W.B.C.	many W.B.C.	Left pyelitis— clinically
16 37230	28	98 ⁴	4	104	8	104 ²	8	?	?	?	?	?	?	40 W.B.C.	40 W.B.C.	Bilateral pyelitis— cystoscopically
17 36735	16	98 ⁶	3	100	+	?	+	?	?	?	?	?	?	?	?	?

Uncomplicated Cases: Average number days intermittent drainage 3.07
Average number days constant drainage 5.3
Average number days before temperature normal 8.

moval of the catheter, the bladder residual was measured and if more than $1\frac{1}{2}$ ounces were obtained, constant drainage was again instituted. This form of bladder treatment is very comfortable and much less annoying than frequent catheterization.

The number of days of treatment in all the cases may be taken as the time necessary for the bladder to regain its ability to empty itself, as treatment was not discontinued until a residual of less than $1\frac{1}{2}$ ounces was demonstrated immediately after voiding. The time for constant drainage may be slightly longer than actually necessary, due to the inadvisability of removing the catheter daily, testing for residual, and perhaps finding it advisable to replace it.

Exclusive of complicated cases, the average number of days of treatment by intermittent drainage alone (Table I) was 5.33 days compared with 6.5 days by constant drainage alone (Table II). The average number of days before temperature remained below 99.2° , was the same under each method, namely, 6.6 days.

As shown in Table III, 17 cases were treated by intermittent drainage from 1 to 5 days, then put on constant drainage until relieved. Such a change was not anticipated when intermittent drainage was begun, but was done either because the temperature was higher than desired, or, the bladder residual was not decreasing satisfactorily. In this group, the average length of the combined treatment was 8.1 days. Eight days were required before the temperature remained normal (Table III).

There were 5 cases of postpartum pyelitis which complicated these 39 cases of acute retention, 12.8 per cent. This of course is much higher than the average incidence of postpartum pyelitis. One case occurred with intermittent drainage alone. The four pyelitis cases in Table III began the pyelitis while the patient was on intermittent drainage treatment. It should be noted that in this group of acute retention cases, no upper urinary complications arose with a patient on constant drainage.

NONACUTE RETENTION WITH BLADDER RESIDUAL

Residual bladder urine during pregnancy and puerperium in patients voiding ordinary amounts has been recognized for some time. In contrast to postpartum cases we have seldom found a bladder residual of more than $\frac{1}{2}$ ounce during pregnancy, although Stevens and Arthur⁵ reported 33 $\frac{1}{3}$ per cent of pregnant women carrying bladder residuals. Curtis⁶ has found bladder residuals in 64 per cent of postpartum cases after the return of spontaneous voiding.

Holsteck's work, quoted by Shutter,³ refers to 30 unselected postpartum cases who were catheterized daily for one week after delivery. The average residual one day after delivery was 107 c.c. for primiparae, 58 c.c. for multiparae. One week later the average residual was 14 c.c.

TABLE IV. NONACUTE RETENTION. TREATMENT: INTERMITTENT DRAINAGE

CASE NO.	AMOUNT RESIDUAL OZ.	TEMPERATURE BEFORE TREATMENT	NUMBER OF DAYS OF TREATMENT	HIGHEST TEMPERATURE DURING TREATMENT	NUMBER DAYS TREATMENT BE- FORE NORMAL	URINE SEDIMENT BEFORE TREATMENT	URINE SEDIMENT DURING TREATMENT	COMPLICATIONS
1	36198	32	2	1012	1	few W.B.C.	few W.B.C.	none
2	36323	7	2	101	3	few W.B.C.	few W.B.C.	none
3	38031	7	4	101	13	many W.B.C.	few W.B.C.	none
4	32943	40	11	101e	5	negative	negative	none
Uncomplicated Cases: Average number days of treatment					4.86			
Average number days until temperature normal					5.5			

TABLE V. NONACUTE RETENTION. TREATMENT: CONSTANT DRAINAGE

CASE NO.	AMOUNT RESIDUAL OZ.	TEMPERATURE BEFORE TREATMENT	NUMBER OF DAYS OF TREATMENT	HIGHEST TEMPERATURE DURING TREATMENT	NUMBER DAYS TREATMENT BE- FORE NORMAL	URINE SEDIMENT BEFORE TREATMENT	URINE SEDIMENT DURING TREATMENT	COMPLICATIONS
1	35034	60	4	984	1	negative	many W.B.C.	none
2	35585	25	4	1022	2	many W.B.C.	many W.B.C.	none
3	37792	6	2	994	1	negative	many W.B.C.	none
4	37703	14	4	100	1	many W.B.C.	few W.B.C.	none
5	38088	+	3	103	3	few W.B.C.	?	none
6	38166	43	3	1006	1	negative	negative	none
7	39029	8	3	1024	5	negative	few W.B.C.	none
8	35661	3	13	103	17	negative	many W.B.C.	Rt. pyelitis—
9	38174	++	20	?	24	negative	many W.B.C.	Rt. pyelitis— cystoscopically
Uncomplicated Cases: Average number days of treatment					3.28			
Average number days until temperature normal					2.			

TABLE VI. NONACUTE RETENTION. TREATMENT: INTERMITTENT AND CONSTANT DRAINAGE

CASE NO.	AMOUNT RESIDUAL OZ.	TEMPERATURE BEFORE TREATMENT	INTERMITTENT DRAINAGE		CONSTANT DRAINAGE		NUMBER DAYS TREATMENT BEFORE NORMAL TEMPERATURE	URINE SEDIMENT BEFORE TREATMENT	URINE SEDIMENT DURING TREATMENT	COMPLICATIONS
			NUMBER DAYS	HIGHEST TEMPERATURE	NUMBER DAYS	HIGHEST TEMPERATURE				
1	35	99 ^a	3	100 ^a	4	100	7	negative	many W.B.C.	none
2	35168	100	2	102 ^a	4	101	6	?	few W.B.C.	none
3	35895	101	2	101 ^a	4	101	5	many W.B.C.	many W.B.C.	none
4	36398	99 ^a	2	99 ^a	6	100	5	?	many W.B.C.	none
5	32781	102	3	100 ^a	3	99	4	many W.B.C.	many W.B.C.	none
6	32697	99	3	103 ^a	9	104	8	many W.B.C.	many W.B.C.	Bilateral pyelitis cystoscopically

Uncomplicated Cases:

Average number days intermittent drainage
Average number days constant drainage
Average number days before temperature normal

2.4
4.2
5.4

in primipara, and 7.5 c.c. in multiparae. Factors responsible for these residuals are no doubt similar to factors already mentioned as responsible for acute retention.

Patients with postpartum bladder residuals often refer to suprapubic or perineal discomfort, frequent urination, dysuria, or a feeling of not having emptied the bladder. Frequently they void in small amounts. In a number of cases the residual will be of sufficient quantity to give a palpable bladder. Occasionally it is difficult to differentiate by palpation between the bladder and a subinvolved uterus. The bladder is usually distinctly softer, with a less sharply defined upper margin, and is flat to percussion. Catheterization will either confirm or deny ones opinion concerning the mass.

Nineteen cases in this group, 32.76 per cent of the bladder complications did not have acute retention but had bladder residuals varying from 3 to 66 ounces. The average residual was 28 ounces. These cases are tabulated in Tables IV, V, and VI. All of these patients had temperatures over 99°, the highest in the otherwise uncomplicated cases being 103°. Temperatures of 100° to 102° were common. In these cases, no other cause for temperature could be found. Urinary sediments before treatment were normal in 7, showed a moderate number to many W.B.C. in 8, 4 not examined. Bladder residual as a cause of postpartum temperature is well worth keeping in mind.

The intermittent drainage cases averaged 4.86 days of treatment against 3.28 days for the cases treated with constant drainage. An average of 5.5 days were necessary to reach essentially normal temperature in cases treated with intermittent drainage, in contrast to only two days in those treated with constant drainage (Tables IV and V).

Table VI shows 6 cases in which intermittent drainage was begun but later changed to constant drainage. The reasons for changing were the same as given above for Table III. Average length of treatment was 6.6 days, requiring an average of 5.4 days for temperature to reach and remain normal.

There were 3 cases of postpartum pyelitis complicating these 19 cases, 15 per cent, again much higher than the average incidence of postpartum pyelitis. Two cases occurred in patients on constant drainage, one case on intermittent drainage. In all the 58 cases here tabulated, there were 8 cases of postpartum pyelitis, 6 of which occurred with intermittent drainage, 2 with constant drainage. We believe that acute retention or a bladder residual in the postpartum cases is conducive to pyelitis.

The catheter plays such a dominating part in the diagnosis and treatment of these conditions that its frequent use must be justified. In the past the catheter has been held responsible for cystitis following acute retention. There is sufficient evidence to change such an opinion as to the cause of so-called "catheter cystitis." Introduction

of bacteria into a normal bladder does not cause infection. Curtis⁷ has long maintained that residual urine proves favorable for bacterial growth and was the most important factor in this type of cystitis. Cabot⁸ believes that the tissues of the distended bladder wall become devitalized from pressure and interference with the venous return. Such tissue is much less resistant to bacterial invasion and offers a fertile field for growth. Distention of the bladder may cause small lacerations in the mucosa and permit a bacterial entry.⁹ These factors combined with the congestion following relief of the retention furnish grounds to absolve the catheter as the cause of cystitis in such cases. Bladder infection would probably be reduced if catheterization were not postponed to the point of an overdistended bladder. The proper and timely use of the catheter will decrease the incidence in this type of cystitis rather than cause it.

While the follow-up work on the 1925-26 cases has not been entirely satisfactory, there are a sufficient number of cases to believe that after these postpartum bladders begin to empty themselves, the urine sediment which perhaps showed pus either before or during treatment becomes negative within two months.

In determining the value of a certain treatment for postpartum bladders, the following points must be considered: (1) speed in getting the bladder capable of emptying itself, (2) effective reduction of temperature, (3) negative urine as soon as possible, (4) avoidance of upper urinary complications.

It is our opinion that constant drainage accomplishes these results more effectively in the nonacute retention cases which carry bladder residuals than does intermittent drainage, as shown in Tables IV and V. This form of treatment is recommended in such cases. In cases of acute retention, constant drainage has not brought an existing temperature down more rapidly than intermittent drainage and in this series its use has been necessary slightly longer to relieve the bladder residual. However, postpartum pyelitis occurred less frequently in the constant drainage cases. For acute retention, intermittent drainage as outlined is advised, instituting constant drainage at the end of forty-eight hours, if there still exists a bladder residual, or elevated temperature which seems due to the urinary complication.

I wish to express my appreciation to Dr. E. G. Crabtree who first advised the use of constant bladder drainage in this clinic, to Dr. F. S. Newell, and to the Residents and House Officers for their cooperation in this study.

CONCLUSIONS

1. Postpartum bladder complications are sometimes overlooked.
2. Unexplained postpartum fever may be due to bladder residual.
3. Of the bladder complications 87.6 per cent occur in primiparae.
4. No one type of delivery is responsible.

5. Injury to bladder wall at delivery, increased bladder capacity, and temporarily disturbed function of nerves to the bladder are believed to be responsible.

6. Treatment advised for acute retention is intermittent drainage as outlined, changing to constant drainage after forty-eight hours if there is still a bladder residual over 1½ ounces, or a fever otherwise not explained.

7. Treatment advised for nonacute retention bladders having a residual is immediate constant drainage.

8. Cystitis in such cases is due to residual urine and to injury to the bladder mucosa from overdistention or trauma rather than to the catheter.

9. Acute retention and bladder residual predisposes to postpartum pyelitis.

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99 COMMONWEALTH AVENUE.

Gardiner-Hill and Smith: Menorrhagia as a Symptom of Myxedema. The Lancet, 1927, ccxii, 862.

The writers analyzed the menstrual histories of 59 patients with myxedema. They calculated that myxedema tends to develop in approximating two-thirds of all cases before natural menopause, and in the majority of these cases it is accompanied by menorrhagia.

They emphasize particularly that where pelvic examination reveals no abnormality, the possibility of thyroid deficiency should always be considered.

NORMAN F. MILLER.

PROTEIN THERAPY IN GYNECOLOGY*

BY G. F. HIBBERT, M.D., CHICAGO, ILL.

THE chief fundamental upon which every form of therapy is based is to aid the organism in fighting those factors that produce the disease of the organism. Not only do we use specific therapy, that is, the neutralization and destruction of toxic substances, but also non-specific therapy that through irritation produces activation of the diseased tissue. To produce the activation foreign substances are employed, preferably proteins introduced parenterally. These protein bodies activate the protoplasm and increase the functioning of the cell. This irritative influence upon inflamed tissue leads to the destruction of the weakened cells, and on the other hand, stimulates the remaining healthy cells to more energetic growth.

Protein therapy was first demonstrated more than twenty-five years ago by Koch and Pasteur, and the work has been developed by Ehrlich, Flexner, and others to the extent that specific immunization is now used with impunity. Out of the primary and basic form of therapy, the so-called nonspecific protein therapy has developed, and the work of these pioneers shows that foreign serums and antitoxins produced remedial reactions in such conditions as arthritis, tuberculosis, and septicemias when injected into the infected organism. As the knowledge of physiologic chemistry and immunology increased, various forms of proteins were used, such as normal blood taken from the human being, the goat, horse and guinea pig, cerebrospinal fluid, leucocytic extract, egg albumen, milk, vaccines, and many others. Milk was first used by Lindig, in the form of a purified casein preparation which he called "caseosan," and Schmidt and Saxl in 1916 used boiled pasteurized milk in their work. Uddgren in 1918 carried on a series of experiments using a sterile milk preparation and obtained very much the same results. During the last decade many prominent biologists, such as Fränkel, Wright, Lindig, Müller, Holler, Peterson, and Hektoen, have done exhaustive work upon the subject, and I believe from their results that some day protein therapy will have replaced many forms of present day therapeutics and will prove to be one of the greatest adjuncts to preventive medicine.

In the field of urology, nonspecific protein therapy has established a name for itself as seen in the work done by Culver in 1921, who reported a series of cases of acute and chronic gonorrheal infection

*Read at a meeting of the Chicago Gynecological Society, April 20, 1928.

treated by milk injections. Lewi, in 1923, states that milk injections are very beneficial in treating chronic venereal infections that do not respond to other forms of therapy. Holloway and von Lackum, of Rochester, in 1923 wrote a paper on the *Local Aspects of Chronic Prostatitis*, in which special emphasis was placed upon the use of milk injections. In the field of ophthalmology we find such enthusiastic workers as May, who in 1924 read a paper discussing the value of foreign protein therapy in connection with diseases of the eye. In the field of internal medicine, work done by J. W. Miller in 1921 in connection with acute infections, and by Eidelberg in 1922 with arthritis, show how beneficial this form of treatment is.

Gynecologists have been rather reluctant to accept protein therapy as a standard form of treatment in their special field, and I believe that one reason for this cautious attitude is a lack of careful study and an indifferent air toward the work. It must be remembered that up to only a short time ago, a great percentage of gynecologic patients were always considered clear-cut surgical cases. Fortunately for the patients this radical point of view has been greatly tempered, and as we observe the pendulum's rise on the conservative arch of its swing, we notice an ever increasing interest in protein therapy. Gellhorn in the *AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY* of November, 1924, highly recommends protein therapy as a means of treating gonorrhea in the female, and reports several cases of generalized pelvic infection apparently cured after a series of injections. Rawls, in the *New York State Journal of Medicine* in December, 1925, writes of the use of milk injections in pelvic infections. More work along this line has been done in the European clinics than in this country, and their results show that protein therapy has a definite place in the treatment of inflammatory conditions of the pelvis.

With the development of nonspecific therapy, there have been many endeavors made to find a satisfactory explanation for the therapeutic results obtained. We know that it is impossible for us at this time, with our meager knowledge of physiologic and colloidal chemistry, to comprehend the intricate chemical changes that take place in the cells of the body under normal or pathologic conditions. But from the exhaustive research of the serologists and immunologists, aided by the microscope, we can follow many of the changes taking place in the blood stream and tissues under normal and diseased conditions, and especially following the introduction of foreign proteins parenterally. These changes are divided into a "general reaction," manifested clinically usually by a slight chill, a rise in body temperature, and perhaps nausea, this being usually followed by a feeling of exhilaration that may last for several days. It is during this period that we

know there is a general rejuvenation of all the cells of the body, and the worn-out fighting forces of the organism are replenished and activated, the phagocytic properties are restored, and the rate of metabolism as well as catabolism is increased. The "local reaction" is manifested by an increased tenderness at the site of the infection, and by inflammation, with moderate swelling and redness of the parts. This is, of course, identical with the reaction shown by all the remote tissues and organs, but here we have a more intensified warfare being carried on by definitely diseased cells against bacterial poisons and active pathogenic organisms.

Work done by Holler, Weiss, Hektoen and others show conclusively that following the injection of foreign protein there is a marked increase of function in all of the hematopoietic organs, and a corresponding increase in the number of phagocytes of the blood stream. Also we may assume from the apparent increase of functionability of the great filtering centers of the body, namely, the spleen, red bone marrow, and liver, that the large number of active antibodies produced are rapidly causing an agglutination and clumping of bacteria which are being trapped in these filters. Practically all workers in this field have proved that there is always a moderate increase in the eosinophiles and a marked increase in the polymorphonuclear leucocytes of the neutrophile type.

Since milk is composed of many elements, it is difficult to determine just what components are responsible for the results. Uddgren is of the impression that the bacterial content is responsible for a large percentage of the reactions, as he showed that reactions following the use of sterile, boiled milk were always much less severe than when pasteurized milk was used. Bessau, Decastello, and Müller believe this true to a certain extent but also believe that the split proteins found in the milk play an important rôle. Schmidt and Kaznelson have often noticed a primary leucopenia lasting for a period of twenty-four hours before the leucocytosis was noticed, and this was also observed in the opsonic index curve by Hektoen and others.

In gynecology and particularly in the dispensary work, one of the chief complaints that brings patients to us is pain. Very often this pain is persistent and severe enough to incapacitate the patient to the extent that she cannot earn a livelihood. A large percentage of the cases used as material for this paper usually manifested the following symptoms in some degree:

1. Pain, usually of a persistent type, either fairly well localized to either lower abdominal quadrant or culdesac, or generalized over the entire lower abdomen.

2. Backache, sacroiliac type, more noticeable after physical exertion, or before, during, and after menstruation.
3. A feeling of fullness and pressure over the lower abdomen.
4. Irregular or prolonged menstruation, and oftentimes bleeding between periods.
5. An irritating, white, or yellow vaginal discharge.
6. Intermittent bladder tenderness, accompanied by frequency of urination.

It is often very difficult in cases of long standing to make any clinical diagnosis other than that of a generalized pelvic infection, but an attempt has been made to diagnose and classify all the cases from an etiologic and clinical standpoint. A careful history, smears, and blood tests were used where indicated, and these were checked so as to increase our accuracy. Generally, I found that the cases could be classified as definite gonorrheal infections, postpartum infections, post-abortive infections, and cases of doubtful etiology. It was also necessary in connection with history taking to rule out the poor risks. I have found, as others have, that there are definite contraindications for protein therapy. Patients giving a definite history of serum sickness, asthma, epilepsy, diabetes, or myocarditis are not fit subjects, likewise pregnancy and arteriosclerosis are contraindications. If the danger of anaphylaxis is to be minimized, the above precautions must be considered. I might also add that the most important point in the technic to abolish anaphylactic shock is to be positive that the end of the hypodermic needle does not rest within a vein. By drawing back the piston of the syringe before injecting the material is the only safe method of determining this and should always be done.

A careful bimanual examination of these patients was made before they were subjected to these routine injections and an accurate sketch was recorded upon the chart of the findings. The findings were usually checked by another member of the clinic, and the sketches were recorded at regular intervals to record any change in the pelvic condition. After the patients had received the entire course of injections, they were temporarily discharged with instructions to return to the clinic at the end of a three-month interval, at which time a post card was sent to remind them. At these periods, a careful interval history was obtained, a thorough pelvic examination made, and a sketch made of the findings. This was carried out over the period of a year for the purpose of determining the permanency of the cure.

Examination of these cases usually revealed the following conditions to some extent:

1. Cervix: Usually showed evidences of infection, and in the multiparae were enlarged, boggy, everted, and eroded.

2. Uterus: Often in malposition, usually retroverted, or displaced laterally and fixed, soft, enlarged, and tender to touch; or absent as in cases having had a hysterectomy.

3. Adnexa: Usually bilaterally involved, enlarged, very tender, and often a soft, irregular mass involving the ovary, and filling the side of the pelvis and culdesac was demonstrable.

4. Uterosacral ligaments: Often very tender and distinctly palpable in the posterior fornix.

5. Bladder: Often marked tenderness over the area after complete emptying.

In other words, the findings were essentially those of acute or chronic pelvic infections.

The technic used in treating these cases was uniform in nearly all instances, the variations being due to peculiarities shown by individual cases. The preparation known as Aolan was used because of its accessibility, relatively low cost, and the fact that it is a fairly well-standardized, sterile product. The initial dose used was 4 c.c., and at regular four-day intervals, a dose of 7 c.c. was given. I found by experience, that patients react better if small doses are given at frequent intervals rather than relatively large doses (10 c.c.) at intervals of one week. The injections were given deep into the gluteal muscles, and the area over the site of injection was not massaged. To satisfy myself that the desired "general reaction" was being obtained, the temperature curve and leucocytosis were recorded in many of the cases of private practice. Whenever the patients complained of severe headaches following an injection, a rest period of one week was allowed before resuming the series. Patients were asked to report any chills experienced, but fortunately, none was noticed. The only other therapeutic measure instituted along with the injections of foreign proteins were:

1. Warm alkaline douches, used in many instances for psychic effect.
2. Cauterization of badly eroded cervixes.
3. Diet used to help alleviate constipation.
4. Knee-chest position used where inflammatory exudates were responsible for malposition of the uterus.
5. Diathermy was used in conjunction with the protein therapy in a series of eighteen cases but these were not included in the original series. This therapy was carried out along with the injections and in several cases continued after the injections were completed. The Chapman type of electrodes was found to be very effective, the other electrode being placed upon the lower abdomen or upon the sacrum. Many of the persistent cases yielded nicely to this combination of treatment.

Where there were definite, clear-cut indications for surgery, such as uterine fibromas, ovarian cysts, rectocystocele, and uterine prolapse, the cases were not considered desirable material, excepting where there was an active pelvic inflammation; in these cases, the patients were given a series of twelve injections before being operated upon, and here I found that these patients were far better operative risks and recovered more rapidly than those not receiving the Aolan.

TABULATION OF CASES

Number of patients treated	152
Number of injections given	1,824
Number cases of anaphylactic shock	0
Percentage of cases relieved entirely of pain	82%
Percentage of cases relieved of pain and pathology	46%
Percentage of patients not helped by injections	14%
Number of cases of gonorrhea	42
Number of cases of postpartum-postabortive infection	67
Number of cases of unknown etiology	43
Number of cases of unilateral salpingitis	51
Number of cases of bilateral salpingitis	76
Number of cases of bilateral salpingitis and generalized adnexitis	26
Number of cases combined with diathermy treatments	18

I fully realize that many gynecologists stamp protein therapy as a modification of the old "shotgun prescription" type of treatment but at the same time, we must remember that we are dealing with a condition that has evolved itself into a vicious circle, and no one definite pathologic identity exists in many instances. Furthermore, many of these patients have been treading the halls of our clinic for months and have been the recipients of far too many vaginal tamponades and douches. Finally after having derived no benefit, they are sent to the operating table for a laparotomy. It was interesting to note that several patients in this series were patients who, after operation for a long-standing pelvic infection, reported to our clinic complaining of the same pain they had before operation, and were infinitely better after receiving twelve injections of Aolan.

The results obtained were very instructive and in many cases gratifying. It was surprising to feel by palpation these large, exquisitely tender inflammatory masses begin to "melt away" after from one to five injections and to be able to lift a uterus up out of the culdesac that at the beginning of the treatment was definitely fixed. The patients themselves voluntarily would tell me that the backache and pain were much better and they had a better appetite, slept better, and "felt altogether different." Perhaps these patients were not "cured" in the scientific sense of the word, but at least they were benefited to the extent of returning to their work and were a benefit to the community, and were encouraged "to carry on" once more. The result in a large percentage of the cases was very good, but many patients

derived very little, if any, benefit. This, of course, was to be expected, but from my observations I am sure that the following conclusions may be drawn:

1. That acute and chronic pelvic inflammatory infections are benefited by the injections of foreign protein.
2. That the results derived from foreign protein therapy are based upon scientific evidence and facts and are not mythical or psychic in character.
3. That protein therapy is a conservative form of therapy and should always be thought of in the management of inflammatory pelvic lesions before operative measures are attempted.

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6353 BROADWAY.

(For discussion, see page 272.)

THE INTERPOSITION OPERATION FOR PROLAPSE OF THE UTERUS

A STATISTICAL STUDY OF 91 CONSECUTIVE OPERATIONS AND AN ANALYSIS OF THE END-RESULTS*

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THE interposition operation for prolapse of the uterus has long since become established as one of the standard procedures in gynecology. Simultaneously developed by Watkins, of Chicago, and Wertheim, of Vienna, in 1899 the operation has, to a large extent, in certain types of prolapse displaced all other methods in most clinics.

Indications.—In the gynecologic department of the Michael Reese Hospital the interposition operation is selected for those cases of prolapse in which there is a large cystocele. The patient must be past the menopause or be willing to be sterilized. The reason for this is obvious: pregnancy and labor give rise to a high degree of dystocia in the interposed uterus. This procedure is best suited for those patients in whom the corpus is of a size sufficient to occlude properly the

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hernial opening and prevent secondary bladder prolapse. The selection of patients must be limited further to those in whom there is no uterine tumor too large to allow the fundus to come through the peritoneal opening. In addition there must be neither gross adnexal disease nor pelvic adhesions.

Incidence.—This report is an analysis of the last 91 consecutive interposition operations done for prolapse of the uterus by the gynecologic staff of the Michael Reese Hospital. During the period covered by this series there were 129 operations for prolapse of the uterus done by various other methods, making an incidence of approximately 40 per cent for the interposition operation.

Anamnesis.—The average age was forty-five and five-tenths years. The oldest patient was sixty-five years and the youngest was twenty-four years. The latter was a para v, with partial prolapse and a large cystocele in whom sterilization was requested by the Social Service Department. Four authors report average ages of forty-three years,² forty-four years,³ forty-five years,⁴ and fifty-six years⁵ and two give an age range of thirty-three to seventy⁶ and twenty-five to sixty-eight.³ Twenty-eight patients (31 per cent) were definitely through the menopause. In three other series the figures were 29 per cent,³ 37 per cent,⁶ and 39 per cent.⁷

Age Incidence.—The oldest patient was sixty-five, the youngest twenty-four, the average age being forty-five and one-half years.

Parity Incidence.—That parity plays a rôle in the production of prolapse of the uterus is axiomatic. Nevertheless there was one nullipara and five primiparae in whom the interposition operation was indicated. The average parity for the entire series was 4.4, and they ranged from nullipara to para xiv. One author⁵ gives an average parity of 4 and the range varies from 1 to 12² to 1 to 16.⁶

Para	O	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV
No.	1	5	12	16	17	16	8	5	5	2	2	1			14

Previous Operations.—Ten patients had previously undergone gynecologic operations previously. There were 6 anterior and posterior colporrhaphies, 2 Gilliam suspension operations, 1 cervical amputation, and 1 prolapse operation performed ten years previously, type unknown.

Symptoms.—The symptoms complained of, in the order of their frequency, were protrusion 56, or 61 per cent; backache 33, or 36 per cent; urinary frequency 29, or 32 per cent; constipation 23, or 25 per cent; lower abdominal pain 17, or 19 per cent; bearing down 16, or 17 per cent; dysuria 14, or 15 per cent; leucorrhea 8, or 9 per cent; metrorrhagia 3, or 3 per cent; incontinence 2, or 2 per cent; menorrhagia 1, or 1 per cent. Spaulding's² analysis of complaints shows a striking resemblance and parallel in the order of their frequency, viz., protrusion

<i>Symptom</i>	<i>Number</i>	<i>Percentage</i>
Protrusion	56	61%
Backache	33	36%
Frequency	29	32%
Constipation	23	25%
Lower abdominal pain	17	19%
Bearing down	16	17%
Dysuria	14	15%
Leucorrhea	8	9%
Metrorrhagia	3	3%
Incontinence	2	2%
Menorrhagia	1	1%

78 per cent, backache 42 per cent, constipation 37 per cent, dysuria 18 per cent, and incontinence 17 per cent. This last figure which is so widely at variance with our own percentage may be due to a difference in interpretation.

Pathology.—Partial prolapse occurred 47 times, or 52 per cent, and complete prolapse 44 times, or 48 per cent. Complete prolapse as used here includes all degrees of prolapse in which the cervix or corpus protrudes through the vulva. Partial prolapse includes all degrees of prolapse in which the cervix does not protrude. By a more accurate classification our series presents the following figures: First degree (cervix down to the level of the ischial spines) 7 cases, or 8 per cent; second degree (cervix to vulva) 42 cases, or 46 per cent, and third degree (cervix or corpus through the vulva) 42 cases, or 46 per cent. Both classifications are given because there is no uniformity in American, English, or German textbooks or literature, and the term procidentia is used indiscriminately for cases in which either the corpus or the cervix protrudes through the vulva. There is opportunity here for clarification and unanimity of expression.

<i>Prolapse</i>			<i>Cervical hypertrophy</i>	11 cases
First degree	7 cases	8%	<i>Cervical lacerations</i>	31 cases
Second degree	42 cases	46%	<i>Fibrosis uteri</i>	7 cases
Third degree	42 cases	46%	<i>Fibroids</i>	5 cases
Cystocele	81 cases		<i>Cystic ovary</i>	1 case
Rectocele	91 cases			

Cystocele and rectocele were noted in 83 patients and rectocele in 8 patients. Cervical hypertrophy occurred 11 times and marked cervical lacerations 31 times. In 7 patients there was a definite fibrosis uteri and 5 patients exhibited one to four small fibroids. Polycystic degeneration of the ovary occurred once.

Technic.—Many patients with prolapse of the uterus show the effects of prolonged edema together with superficial ulceration of the portio mucosa and hernial sac. These conditions are given preliminary attention by bed rest with the foot of the bed elevated sufficiently to maintain reposition. During this time the ulcerations are treated with dermatol tampons or other similar antiseptics.

The technic of the interposition operation requires no detailed exposition. Several points, however, are worth mentioning. The dissection of the anterior vaginal wall should be thin enough to develop the fascial layer. Hemostasis in the deep lateral angles is best accomplished by double clamp and ligation of the vesico-uterine ligaments according to Spaulding.¹³ Painstaking hemostasis throughout the operation preventing hematomas and secondary infection is imperative. The peritoneal opening should be closed by attachment to the posterior surface of the uterus. The reason for this is apparent. Usually the opening is snug enough to prevent automatically protrusion of abdominal viscera but occasionally the peritoneum tears and, with postoperative vomiting, a loop of bowel may become incarcerated.

The fundus uteri should be anchored securely against the pubic bone, using bilateral mattress sutures of forty day chromic gut or kangaroo tendon. Placing the anchoring sutures anterior to the fundus decreases the acute angulation of the uterus but assures a firm fixation. Placing the anchoring sutures posterior to the fundus fulfills the technic of the operation as originally described but increases the likelihood of recurrence if there is marked relaxation of the broad ligaments and uterosacral ligaments. For vaginal apposition a running lock-stitch is used without tension, employing twenty-day chromic gut in two or more sections. No vaginal packing is used.

Operative Procedures.—A posterior colpoperineorrhaphy was done in each patient. This step is essential in the prevention of recurrence. Cervical amputation was done 11 times and cervical repair 15 times, a total of 26 operations on the cervix, or 29 per cent. Three authors give the following incidence for this procedure: 30 per cent,⁶ 66 per cent,⁷ 79 per cent.⁸ Dilatation and curettage were done 6 times; myo-

OPERATIVE PROCEDURES

Postcolpoperineorrhaphy	91
Cervical amputation	11
Cervical reconstruction	15
Dilatation and curettage	6
Myomectomy	5
Defundation	2
Radium insertion	1
Oophorectomy	1
Sterilization (cornual excision)	49

metomy, 5 times, defundation, twice, radium insertion once and an oophorectomy once. There were also 3 hemorrhoidectomies.

Forty-nine patients, 53 per cent, were sterilized by cornual excision and 28, or 31 per cent, were definitely past the menopause, a total of 77, or 84 per cent. Of the remaining 14 patients, 12 were having menopausal symptoms at the time of operation and in the operative write-up no mention was made of sterilization. In 2 patients steriliza-

tion was forgotten. One of these, a para iv, aged thirty-eight years, was sterilized by deep x-ray therapy before leaving the hospital. The other, a para vii, aged forty-one years, subsequently became pregnant and was delivered by cesarean section at which time sterilization was done. This case has been reported previously by Stein.¹

Immediate Postoperative Results.—There was 1 death in this series, an incidence of 1.1 per cent. The patient was a para v, aged sixty-five years, whose preoperative blood pressure was 170 mm. The uterus was completely prolapsed (3rd degree). The convalescence was uneventful and afebrile. On the eighth day at the time of the removal of the perineal silkworm gut sutures, the patient fainted. No significance was attached to this as she promptly revived. Thirty minutes later she suddenly gasped and died. In the absence of an autopsy a diagnosis of cerebral embolism was made. Mortality figures in the literature range from no deaths in two series of 56 patients⁵ and 58 patients respectively⁸ to 1.3 per cent,⁶ 1.7 per cent,⁴ and 4.4 per cent.⁷

IMMEDIATE POSTOPERATIVE RESULTS

Condition	Number	Percentage
Death-embolism	1	1.1
101° F. x 1	39	43.0
101° F. x 7 or more	10	11.0
Infected perineum	2	2.2
Infected ant. vag. wall	2	2.2
Foul discharge	4	4.4
Pelvic abscess	2	2.2
Shock and sepsis	1	1.1

Thirty-nine patients (43 per cent) had a postoperative temperature of 101° F. on one or more days. Of these 10 (11 per cent) had a temperature of 101° F. or more for seven days. Definite infection of the operative field occurred in 11 (12.1 per cent) patients. Two had infections of the perineum, 2 of the anterior vaginal wall, 4 had foul discharges without localization, 2 developed pelvic abscess, and 1 had sepsis and shock from which the recovery was complete, with a satisfactory operative result. Of the 5 failures in this series only 2 occurred in patients who developed postoperative infections.

Fifty-two patients (57 per cent) required no postoperative catheterization. In Rongy's series 14 per cent⁸ required no catheterization. Of the remaining 39 patients, 11 (12 per cent) were catheterized only once, 16 (18 per cent) were catheterized from one to four days and 11 (12 per cent) were catheterized from five to ten days. One patient was catheterized daily for nineteen days for residual urine. Of 6 patients with cystitis, 5 developed this condition postoperatively. In 2 of these, no catheterization had been done at any time. Two others had been catheterized but once on the first postoperative day. The fifth patient had required catheterization for seven days. The sixth patient had a preoperative cystitis due to the presence of a bladder stone. Brady⁵

reports one case of cystitis in his series, or 1.8 per cent, and Rongy³ 1 case of pyelocystitis, or 1 per cent, of his series.

POSTOPERATIVE CATHETERIZATION

None	52	2 postoperative cystitis
Once	9	2 postoperative cystitis
One day	1	
Two days	5	
Three days	5	
Four days	5	
Five days	2	
Six days	3	
Seven days	2	one postoperative cystitis
Eight days	2	
Nine days	3	
Ten days	1	
Nineteen days	1	daily for residual urine

The average hospital stay in this series was seventeen and two-tenths days. None was sent home before the twelfth day postoperative and the longest stay was sixty-five days. In Rongy's series of 100 patients, the average hospital stay was twenty-five days.

End-Results.—Follow-up examinations were made from five months to seven years postoperative in 64 patients (70 per cent). There were 5 recurrences in 2 of which there had been postoperative infection. Figured on the basis of the follow-up group there were 92.2 per cent successes. Among these 1 patient showed a partial fundus protrusion and 2 showed a first degree prolapse, all 3 patients having originally had third degree prolapse. Of the articles in which a follow-up study was made, Grad reports 78 per cent successes and 14 per cent partial successes—a total of 92 per cent; Pfeffer⁹ gives 92.4 per cent cures; Brady⁵ states "93 per cent good results," and Johnson¹⁰ reports 90 per cent cures. Hundley and Hundley¹¹ show 90 per cent cures; Shaw states that 13 of 58 patients were unimproved or 77 per cent cures but found that there was only 1 failure in the last 21 cases, or 95 per cent cured. Watkins¹² reports 42 per cent perfect results in 49 patients—86 per cent. Miller⁶ states that 93 per cent are well and Phaneuf's series shows 95 per cent cures.

Residual Complaints and Sequelae.—Among 8 patients with residual complaints, leucorrhea existed in 4, backache in 2, spotting in 2 and frequency in 3. There were 4 secondary operations, a Murphy extra-

SEQUELAE

<i>Residual Complaints</i>		<i>Secondary Operations</i>	
Leucorrhea	4 times	1 Murphy extrafascial fixation	
Backache	2 times	1 Mayo vaginal hysterectomy	
Spotting	2 times	1 cesarean section with sterilization	
Frequency	3 times	1 Sturmdorf enucleation of cervix	

fascial fixation and a Mayo vaginal hysterectomy on 2 of the recurrences, the cesarean section previously mentioned, and a Sturmdorf operation for leucorrhea.

CONCLUSIONS

1. This report is an analysis of 91 consecutive interposition operations for prolapse of the uterus. Of the patients who were subsequently examined from five months to seven years postoperative, 92 per cent were cured. There was 1 death, a mortality of 1.1 per cent.

2. The interposition operation is the operation of choice at the Michael Reese Hospital in 40 per cent of all patients with prolapse.

3. The operation is selected for those patients with a large cystocele, a corpus uteri neither too small nor too large, freely movable and without gross adnexal pathology.

4. Cervical amputation or repair is essential in the presence of elongation or disease.

5. A well-reconstructed perineal body is most important for the success of this procedure.

Acknowledgment is hereby made to the members of the gynecologic staff of the Michael Reese Hospital for the use of their records.

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104 SOUTH MICHIGAN AVENUE.

(For discussion, see page 269.)

CARCINOMA OF FUNDUS OF UTERUS FOLLOWING WATKINS' INTERPOSITION OPERATION

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AT THE Fifty-Second Annual Meeting of the American Gynecological Society, in May, 1927, Dr. John A. McGlinn, of Philadelphia, reported a case wherein a successful interposition operation was followed by carcinoma of the body of the uterus. In connection with this he discussed at some length the various pathologic findings following this procedure, and also emphasized the great difficulties which attend any further operative intervention upon a uterus so treated. He found that pregnancy was the most serious complication following the performance of the interposition operation, a number of instances where this has occurred being on record. He was not able to find any instance besides his own where the Watkins procedure had been followed by the development of carcinoma of the fundus. In view of the apparent rarity of such a finding, the following case has an interest which does not ordinarily attach to the neoplasm in question.

Mrs. R., aged fifty-five years when seen August 7, 1919. She was the mother of three children. The menopause had taken place five years before, and two years previously an interposition operation had been performed by another surgeon. Her present complaint was vaginal bleeding which had its onset one month before. There was a foul, bloody discharge now coming from the vagina, but examination showed the results of the operation to have been excellent, with vagina and cervix free from disease. As the difficulty was evidently in the body of the uterus, a diagnostic curettage was undertaken. The material obtained proved typical of carcinoma, and upon this evidence a vaginal hysterectomy was done.

The operation was extremely difficult on account of the previous Watkins procedure. Indeed, even the curettage was difficult to accomplish because of the position of the uterus.

The uterus proved to be very large, showing upon the posterior surface of the fundus an ulcerated growth some 2 cm. by 1 cm., which histologic examination demonstrated to be adenocarcinoma. The patient made an excellent operative recovery, but some eight weeks later ascites developed, this condition proving to be dependent upon malignant metastasis, from which she died about four months after the removal of the uterus.

A consideration of this case and the one reported by McGlinn, which it very closely resembles, leads us to inquire whether carcinoma of the fundus might be induced by the performance of the Watkins operation, and also if the fact that it is such a rare finding, as indicated by the reporting of only 2 cases among the relatively large number of other sequelae of the interposition operation, has any special significance.

As regards the first point, the discussion which followed the presentation of Dr. McGlinn's paper offers some interesting comments. Dr. Dougal Bissell, of the Woman's Hospital, New York, stated that he had done no more than 25 interposition operations, yet in 3 of the patients so treated malignancy of the uterine fundus had later been demonstrated by pathologic examination of curetted material. None of these cases, apparently, had ever been reported. Operation was performed upon 2 patients and in both cases the procedure was found to be very difficult because of the adhesions of the interposed uterus. The speaker gave it as his opinion that the corpus was just as likely to develop malignancy after interposition as if the operation had not been done, but he evidently did not consider the intervention as in any way predisposing to the development of carcinoma. Another speaker stressed the importance of doing a high amputation of the cervix as a preliminary to the Watkins procedure and offered it as his opinion that the likelihood of the woman's subsequently developing carcinoma was thereby greatly lessened, as the cervix is often the seat of laceration, ectropion, and chronic endocervicitis, so that the amputation will "eradicate a good deal of precancerous pathology."

The consensus of opinion seemed to be that where carcinoma of the fundus did develop, it was not because the Watkins operation had been done, but *in spite of it*. Where the tendency toward malignancy of the uterus existed, its chances of development were not enhanced

by the performance of the operation. McGlinn, however, cautioned against carrying out the procedure when there was the slightest reason to suspect the uterus was malignant, or without thorough curettage and microscopic examination of the material so obtained. If malignancy is discovered, hysterectomy, and not interposition, is the proper procedure.

As to the significance of the extreme rarity of malignancy after interposition, figures relating to the prevalence of carcinoma of the uterine fundus in general are pertinent. All writers unite in saying that in comparison with carcinoma of the cervix, that occurring in the uterine fundus is very rare indeed. Cullen, whose textbook on uterine cancer though written in 1900 is still a standard, saw 182 cases of malignancy in six years, 147 of which were of the cervix and 35 of the body of the uterus. Bland merely states that 90 per cent of all uterine carcinomas are in the cervix; Bandler puts it the other way round, saying that only 10 per cent of uterine cancers are observed in the fundus; Graves says that carcinoma of the fundus occurs only one-eighth as often, "according to statistics." Kelly, in his *Operative Gynecology*, gives the total of admissions to his gynecologic clinic at Johns Hopkins Hospital, during the first fifteen years of its existence, as 11,382; of these, 412, or 3.6 per cent, were uterine carcinoma. Only 87 of these uterine carcinomas were found in the fundus, that is, less than 0.8 per cent of all gynecologic admissions to this clinic. Frank, in his *Gynecological and Obstetrical Pathology* states: "About 10 to 15 per cent of uterine cancers occur in the corpus, according to most statistics." In 500 cases Peterson found 94, or 18.8 per cent, cancers of the body; Koblanck, in 6354 cases, only 4.4 per cent; Wilson (London, 1917), in 596 cases, 11.2 per cent, while Wertheim's clinic—possibly the largest and most renowned in all Europe—saw only 70 corporeal to 1500 cervical cancers (4.6 per cent).

At the University Hospital, Philadelphia, in a period of twenty-three years, 12,514 gynecologic patients were observed, among which were 115 cases of fundal carcinoma. This lesion constituted about 15.2 per cent of all genital cancers seen, and 25 per cent of all uterine cancers. These figures, which were given by Charles C. Norris in 1923, are considerably higher than the classic textbook estimates. Meigs, at the Free Hospital for Women, Boston, found that the number of patients with carcinoma of the uterine fundus operated upon there represented 0.47 per cent of all operations at the institution. Though he does not expressly say so, it is probable that practically all of these operations were gynecologic in nature. The actual number of all operations for a given period was 9,566, while the number of cases of carcinoma of the fundus was 44. There were 350 patients with carcinoma of the cervix operated upon during the same length of time. This author makes the following observation upon these figures: "In hospital practice, at least among patients coming from the working

classes, the percentage of adenocarcinoma of the fundus seems to be very much less than the percentage of carcinoma of the cervix. There were 7.9 times as many cases of carcinoma of the cervix as adenocarcinoma of the fundus. On the contrary in private practice there undoubtedly are more cases of adenocarcinoma of the fundus than of carcinoma of the cervix."

From this rather impressive testimony it would seem fair to conclude that the rarity of carcinoma of the fundus following the interposition operation corresponds quite accurately to the rarity of its occurrence in gynecologic admissions generally. It is also quite commonly stated that parous women are more subject to malignancy of the cervix, whereas nulliparous women are more prone to develop fundal lesions. The prevalence of this opinion does not seem to have the same statistical basis as that just considered. Norris and Vogt say, "It would appear that childbirth plays little part in the etiology of this neoplasm, and that the disease is relatively as frequent in the nulliparous as in the multiparous." Thirty-seven of Meigs' 44 patients were married, 33 (75 per cent) having had children; "so that, judging from our figures, the disease is more likely to be found in women who have borne children than in those who have not. . . ."

Many writers (Graves, Montgomery, Adami and Nichols, Hirst) believe carcinoma of the fundus to be a disease of the nulliparous, but this belief is not substantiated in this series, for most of our patients had borne children. Ashton says, "The disease attacks women who have borne children and those who are sterile with about equal frequency." Frank collected the following figures: Among Theilhaber's cases of carcinoma corporis, 27.5 per cent were nulliparae; Deelmann found six times as many nulliparae among patients with corpus carcinoma; Goebel and also Fast concede double the percentage of corpus cancer in the nulliparous, but in women who have borne children, find an equal percentage. Cullen found 52 per cent of 19 cases of corporeal cancer nulliparous, Wilson's figures in 56 cases being 50 per cent. Most of the standard textbooks content themselves with saying, "it seems," "it is said," or "most observers claim" that carcinoma of the fundus occurs most often in women who have never borne children, but, as will be gathered from the quotations above, when concrete statements are made, there does not appear to be substantial agreement, one way or another.

The question naturally arises, inasmuch as the interposition operation is almost invariably done on uteri which have been several times pregnant, whether the fact that its subjects are parous has lessened their liability to cancer of the fundus. One aspect of the matter to which none of the writers seems to call attention is that the majority of women have borne children. More than 80 per cent of women who have reached the age of forty, generally conceded to be the beginning of the "cancer age," are married, and although I have not been able

to find any precise figures, I am quite sure that but a small percentage of these fail to bear at least one child. This is just as true of "private practice" as of the most unselected clinic work, opponents of birth control to the contrary notwithstanding. The fact that so comparatively few women "escape" motherhood before reaching the cancer age vitiates all statistics in regard to nulliparity.

The occasional occurrence of carcinoma of the uterine fundus after the Watkins interposition operation can certainly not be regarded as a contraindication for the employment of a procedure which is of the greatest value in the hands of a competent gynecologist who knows how to select his cases. The necessity of making certain that no incipient malignancy exists in a uterus about to be so treated has already been touched upon. While the routine physical examination would undoubtedly rule out any occult evidences, this is not enough. Thorough curettage, with proper pathologic examination of tissue thus obtained, is the only safe course. Polak, of the Long Island College Hospital, Brooklyn, said in discussion of McGlenn's paper, that it was customary at his institution to precede a vaginal fixation with a high amputation of the cervix, and thereafter to introduce about 50 mg. of radium into the body of the uterus. The purpose of the radium application was to produce atrophy of the uterus and still further safeguard the patient against cancer. This was applicable to birth injuries near the climacteric age.

The possibility of employing radium in prophylactic dosage some weeks previous to operation might also be considered. Such success has attended the use of this element in menopausal hemorrhage and other benign or precancerous lesions that a similar therapy would seem appropriate in the cases under discussion. Where there can be no question of further pregnancies, there is no contraindication to radium if used with skill and caution. As the occurrence of pregnancy is one of the gravest accidents following the interposition operation, and the most experienced gynecologists declare it should never have been done upon a functioning uterus, the possibility of sterilizing the patient by the use of radium is an advantage rather than a drawback. The whole question, however, would be one which would have to be decided in accordance with the demands of the individual case. Notwithstanding, preoperative employment of radium would seem a rational procedure.

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SEVERE TOXEMIA OF PREGNANCY WITH JAUNDICE

REPORT OF CASE WITH FETAL AUTOPSY FINDINGS

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JAUNDICE as a complication of pregnancy is extremely rare, and is usually indicative of acute or subacute yellow atrophy of the liver. We have seen jaundice so rarely in pregnant women that this case in which there was beginning liver atrophy, and definite fetal pathology, we deemed worthy of a detailed report.

CASE REPORT

The patient, Mrs. W., a para ii, aged twenty-four, was first seen by us when admitted to the hospital on August 10, 1927, when she was twenty-six weeks pregnant. The last regular menstrual period was January 29, 1927, and since the onset of pregnancy there had been continuous and progressive vomiting, until at the time of admission the patient was extremely emaciated and unable to retain any food. She also complained of constant, aching, epigastric distress. The previous pregnancy, three years ago, was normal in all respects and the past medical history was negative except for whooping cough in early childhood. Examination on admission showed the skin and sclerae markedly icteric; heart and lungs were negative. The abdomen was soft and the uterine fundus extended just above the umbilicus. The lower edge of the liver was palpable in the epigastric notch. Relative liver dullness began at the level of the fourth rib and absolute dullness at the level of the seventh rib in the right mammary line. There was no edema. Ophthalmoscopic examination revealed normal discs. The temperature on admission was 98.6° F.; pulse, 126, and respiration, 20. The blood pressure was 202/110. The urine was very dark amber in color and was foamy, and contained much bile pigment as revealed by Smith's iodine reagent. There was also a distinct albumin reaction, and few granular and hyaline casts. No leucine or tyrosine crystals were isolated from the urine. The stools were normal in color. The blood findings were as follows: Hemoglobin, 60 per cent; R.B.C., 3,900,000; W.B.C., 12,900; sedimentation time, thirty-five minutes; nonprotein nitrogen, 39 mg.; creatinine, 1.3 mg. The direct van den Bergh test for bile gave a faint immediate positive, while the indirect van den Bergh gave an immediate positive reaction. The icteric index was 40.

With the above findings, we decided to terminate the pregnancy, and accordingly a 5 cm. Voorhees bag was introduced into the uterus and 1½ pounds traction applied. Labor pains began at once and the bag was expelled within six and a half hours. The fetus followed shortly thereafter. The fetus was living but not viable, and showed no signs of icterus.

During the time the bag was in the uterus, the patient was given an intravenous infusion of 500 c.c. of 10 per cent glucose solution, and this was repeated once daily for the next three days, using 25 units of insulin with the first two infusions. The patient vomited several times following the delivery, and the pulse varied from 100 to 126; the temperature was normal. For the next six days, the pulse was around 120 and on the seventh day it dropped to 88, the patient vomiting occasionally during this time. The patient was kept on a diet consisting of carbohydrates and an abundance of fluids. Later a Minot-Murphy diet was followed. On

August 14, 1927, two days postpartum, the blood pressure was 184/118. The urine showed a faint trace of albumin and a faint trace of bile. There was no leucine or tyrosine present, and these substances were not detected on a subsequent examination.

On August 15, the direct van den Bergh test showed a faint immediate positive, while the indirect showed an immediate positive reaction. On this date the icteric index was still 40, showing no change from the first test. The blood chemistry revealed a nonprotein nitrogen of 41 and creatinine of 1.5. Blood pressure was 160/110. By August 16 the urine was completely negative and remained so.

On August 29, two weeks after admission, the direct van den Bergh test was negative for bile, the indirect showing a faint immediate positive. This finding with the indirect test indicated beginning regeneration of liver parenchyma and restoration of function of bile transference. The icteric index at this time was 15. Blood pressure was 130/80. The blood picture revealed hemoglobin, 70 per cent; R.B.C., 4,200,000; W.B.C., 9,600.

The patient left the hospital on August 30, twenty days after admission, and was instructed to follow a régime at home similar to the one followed in the hospital. Two weeks after her discharge the urine was found negative. The blood pressure was 136/85. Four weeks after discharge the blood pressure was 125/80 and remained so on 3 subsequent examinations at fourteen-day intervals. At the last examination, the patient showed a 12-pound gain in weight over the weight on discharge.

Autopsy of Fetus.—At autopsy the fetus measured 37 cm. in length and weighed 1100 grams. The bones of the skull were very soft, and overriding was present. There was no icterus. The fetus was thin and the liver was palpable considerably below the costal margin. On opening the chest, there was no fluid or adhesions in either pleural cavity. The right lung weighed 18 grams, and the left 15 grams. Each was pinkish blue, firm, noncrepitant, and sank in water. Sections made by cutting revealed very little air and no excess of fluid. The thymus was pink and weighed 2 grams. There were several punctate areas of hemorrhage in the epicardium. The pericardial cavity contained no excess of fluid. The heart weighed 8 grams and was normal except for a few small edematous nodules on the cusps of the mitral valve.

The peritoneal cavity, on opening, contained about 15 or 20 c.c. of blood which was not clotted. The liver extended about 2 cm. below the costal margin, and beneath the capsule there were several areas of bloody exudate. The rest of the liver was bluish. Sections made by cutting were uniformly bluish brown, except in some places in which appeared yellowish punctate areas. The liver weighed 55 grams. The spleen was small, bluish, and weighed 3 grams. No malpighian corpuscles could be made out. The pancreas was small, white, and firm. The kidneys, stomach, and intestines were normal in all respects, the kidneys showing marked fetal lobulations. On opening the scalp an area of hemorrhage was found in the skull. On removing the skull, bloody fluid was found over both cortical areas.

Microscopic Examination: Thymus.—The thymus was divided into lobules which showed a distinct cortex and medulla, and in the cortex there were a number of germinal centers. The cortex was composed almost entirely of lymphocytic cells. The medulla likewise consisted chiefly of lymphocytic cells, but there were also seen a number of large endothelial cells. The medulla was quite vascular. Hassel's corpuscles were not numerous and were almost entirely confined to the medulla and here were seen as red, hyaline-staining pearl-like masses.

Lungs.—The section revealed almost solid tissue, there being very few alveolar spaces, and those present were small and irregular. The alveolar walls were rather thick. The blood vessels were not dilated, and the alveolar lining throughout

the section was composed of cuboidal appearing cells. The bronchioles had a folded appearance and were not completely dilated. The blood vessel walls were slightly thickened. The pleura was quite thin.

Heart.—Section of heart muscle revealed an embryonic form of myofibril, the tissue being pale-staining, the nuclei centrally situated, and no striations being visible. The endocardium was thin and showed no inflammatory reaction.

Liver.—The capsule of the liver was thin, and in one area there was a small degree of extravasated red blood cells present. Throughout the section were innumerable blood-forming islands, so that the entire section appeared filled with these structures, and the cells of the islands for the most part were small with darkly-staining nuclei, but there were also a number of leucocytes. The liver cords were distinct and regular, and the cells stained rather faintly and appeared vacuolated. The sinusoids were dilated and filled with red blood cells.

Spleen.—The capsule of the spleen was thin. The malpighian bodies were numerous but not enlarged; they consisted of lymphocytes and in the center was seen a small blood vessel. The walls of the vessels did not appear thickened. The pulp contained many red cells, lymphocytes, and granules of blood pigment, and appeared somewhat fibrotic. The reticular tissue was easily visible.

Pancreas.—Section of the pancreas showed the organ rather incompletely developed, the acini being small and not fully formed, and the stroma rather thick but not fibrous or dense. The islands of Langerhans were not numerous or large; the cells stained well, and the nuclei of some were large and vesicular, but of others were rather small. The lymphoid tissue adjacent to the pancreas likewise showed embryonic structure.

Adrenal.—Section showed the cortex as fairly dark-staining, but the cells were vacuolated. The cells of the zona glomerulosa were spongy, and the stroma between the cords was very scant. The cells of the zona reticularis were not distinct. In the nodules there were a number of blood vessels.

Kidney.—Section revealed an immature picture of development, the glomeruli deeper in the tissue being well-formed but near the periphery the glomeruli appeared as cords and tubules which were crescentic in shape. The anlage of the glomerular tuft was seen invaginating into some of these tubules. The capsule was thin and smooth, and there was no reaction in the pelvis of the kidney.

Bone.—Section showed a well-formed epiphyseal line in which there was good ossification and no inflammatory reaction.

The testicle.—There was a small section of testicle present, and this showed a fetal type of tissue. The seminiferous tubules were incompletely developed, with absent spermatogenesis.

In résumé the anatomic diagnosis was: Prematurity; subdural hemorrhage over the brain cortex; pulmonary atelectasis; hemoperitoneum; subcapsular hemorrhage of liver.

DISCUSSION

The most widely accepted theory of bile production, according to McNee, credits the cells of the reticulo-endothelial system, either those of the spleen or Kupffer cells of the liver, with the breaking down of hemoglobin and the elaboration of bile pigment. The polygonal glandular cells of the liver have chiefly to do with the transference of bile from the vascular capillaries into the bile capillaries. Aschoff believes that bilirubin in passing through the polygonal cells probably is modified in some way, thus accounting for the two varieties of

bilirubin detected by the van den Bergh test. Van den Bergh, using Ehrlich's diazo reagent, found that a positive coupling with production of the azo dye (azo-bilirubin) can be obtained by adding the diazo reagent direct to the icteric serum. Depending upon the rapidity and density of color, the reaction was termed direct or delayed direct. He also found that after precipitation of the serum proteins with alcohol, icteric serum gives an immediate color with the diazo reagent. The application of the method to these alcoholic solutions gives what is known as the indirect reaction, which may be either immediate or delayed. After examining many sera, van den Bergh concluded that in complete obstructive jaundice, a prompt direct reaction is always obtained, whereas in sera in cases of hemolytic jaundice the direct is negative or at least delayed. Thus, he propounded the theory that the occurrence of an immediate direct reaction meant the presence of bilirubin which passed through the polygonal cells of the liver and was then absorbed on account of obstruction, while in cases of sera giving delayed reaction only, the bilirubin was formed independently of the liver cells and did not pass through them.

Our case is satisfactorily explained by this theory. The liver atrophy caused a destruction of polygonal cells; hence, the bile pigment could not pass through into the bile capillaries and was therefore immediately absorbed into the circulation. The test showed an immediate positive with the indirect, and, since some passed through the remaining healthy polygonal cells, a faint positive with the direct van den Bergh test.

We wish to emphasize that jaundice in liver atrophy is not directly due to necrosis and absorption per se, but rather to a functional disturbance in which the liver cells are not able to transfer the pigment which is normally present.

When our patient had clinically recovered, with a return of the icteric index to 15, the direct van den Bergh was negative for bile, while the indirect showed a faint immediate positive. This would indicate that regeneration of the liver parenchyma had reached a degree sufficient for the polygonal cells to transfer the bilirubin into the proper bile canaliculi.

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CARCINOMA OF THE OVARY AFTER THE MENOPAUSE ASSOCIATED WITH RECURRENCE OF UTERINE BLEEDING

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CARCINOMA of the ovary may occur at any age. It is very rare before the age of twenty, uncommon up to the age of forty, and its greatest frequency is between the ages of forty-five and sixty. It is well to note, however, that it is more common after the menopause than before the age of forty. Döderlein's series showed there is an appreciable number of them in the third decade, and they reach their maximum in the second half of the fifth decade. In Byron and Berkoff's series 26 (48.2 per cent) were past the menopause. Massabuan and Etienne classified 120 cases to show the occurrence of the growth with relation to the genital period. They found 13 occurred before puberty, 69 during the menstrual life, and 38 in the menopause. They noticed no relation between cancer of the ovary and the age of the first menstruation or between cancer of the ovary and irregularities of menstruation.

In contrast to carcinomas, sarcomas of the ovary reach their peak in numbers in the second decade, whereas endotheliomas and peritheliomas occur rather evenly throughout life and are only a little more frequent in the fifth decade.

The frequency of ovarian tumors, both benign and malignant, and the relative ratio of each kind to the whole may be seen from figures of a few clinics. Byron and Berkoff found carcinoma of the ovary in 0.27 per cent of 29,844 gynecologic patients. In Döderlein's clinic from 1907 to 1922 there were 15,000 gynecologic cases among which were 800 instances of ovarian tumors. Only 82 of these were malignant or 10 per cent of all ovarian tumors or 0.5 per cent of all gynecologic cases. Lippert found tumors of the ovary were malignant in 15.5 per cent of his 638 patients, while the figures from other clinics range as high as 37 per cent (Debarenditta and Zardin).

There are two classes of primary carcinomas of the ovary: the one is a tumor that is malignant from the onset, the other includes those malignant tumors that develop in an already existing benign growth, usually a cystadenoma. Stübler and Brandess gave an extensive report of 682 ovarian tumors in 670 patients. Among these there were 134 (19.6 per cent) who had primary carcinoma, 33 patients had metastatic carcinoma, besides 22 who had sarcoma, 2 who had endothelioma, and 1 a teratoblastoma. Sixty-nine or more than one-half of the 134 primary carcinomas above mentioned were due to malignant degeneration of cysts.

It may be well to note further the occurrence of these primary carcinomas in relation to the menopause. In the last mentioned series the number of primary malignant adenomas and solid carcinomas of the ovary that developed after the menopause (being 35) was nearly equaled by the number of cystadenomas that took on a malignant phase after the menopause, namely, 29.

The early conception of the origin of malignant tumors of the ovary was that they were primary or existed simultaneously with other tumors of the body. Pfannenstiel, Rokitansky, and Billroth were among those who subscribed to this idea and stated that the metastatic tumor of the ovary was exceedingly rare. This opinion was evidently due in great part to the rapid growth of the tumor in the ovary, where it attained such great size that it overshadowed any other lesion. Thus, it often happened that the primary growth was not observed until the postmortem examination. This old theory was upset by Schlagenhauser in 1902 and now the general view is that when carcinoma of the ovary and of another organ exist at the same time, the growth in the ovary is probably secondary to the other. Figures show that only 20.75 per cent of all ovarian carcinomas are metastatic.

Metastases to another organ from the ovary are rare. Of course it is always possible that both may be primary and have no relation to each other, but this must be most unusual. Involvement of the uterus by a tumor of the ovary is usually by direct extension and not by metastases.

The question of fertility of women with ovarian tumors is an interesting one. Of all ovarian tumors that are a complication of pregnancy, somewhere between 0.46 per cent (Siegel) and 6.6 per cent (Jetter) are malignant. Of 64 malignant tumors of the ovary that arose after the menopause, as above cited, whether primary or the result of malignant change of an already existing tumor, 18 patients were sterile, as compared with 33 patients with metastatic tumors of which only one was sterile. Thus, there seems to be some factor of an ovary that is to become malignant which is incompatible with pregnancy. This is all the more striking because the average age of the former group is older than that of the latter. The 18 cases of sterility with primary malignancies were nearly evenly divided into two groups; the one consisting of adeno- or solid carcinoma numbered 8, and the other consisting of malignant degeneration of cystic adenocarcinoma numbered 10 (Stübler and Brandess).

There seems to be nothing typical or suggestive in the symptoms of carcinoma of the ovary. The onset is insidious, usually with pain in the lower abdomen or back or both. The pains may radiate down the legs. The pains may be mild and vague, or start suddenly and be

severe. Digestive disturbances and constipation are frequent and occasionally dyschesia is noted. Often the first symptom is gradual but steady increase in size of the abdomen. If the increase is rapid, it may be accompanied by severe digestive disturbances. Ascites usually accounts for much of the increase. Loss of weight and weakness, shortness of breath on exertion, and urinary frequency usually follow the above complaints. Some patients may show no symptoms, and the tumor be discovered accidentally. The early signs are pain, menstrual disturbances, and rarely disturbances in the general health. Amenorrhea, irregular menses, and menorrhagia have been noted. Irregularity is most common, and metrorrhagia is more common than excessive menstrual flow.

Examination reveals the usual signs of ovarian tumors, such as enlarged abdomen, sometimes more on one side than on the other; ascites, and a tumor mobile or immobile and easily palpable on bimanual examination. The uterus is small and may be displaced upward or to one side, depending on the location and size of the ovarian tumor. This condition has often been mistaken for benign ovarian tumor, tuberculous peritonitis, or uterine tumor.

Lippert and Glockner were the first to call attention to the recurrence of bleeding from the uterus after the menopause in cases of carcinoma of the ovary. Stübler and Brandess observed 2.4 per cent of all ovarian carcinoma cases had recurrence of bleeding.

Schiffman reports in detail 5 patients varying from fifty-three to seventy-one years of age in whom bleeding recurred from three to eighteen years after the menopause. One patient, aged sixty, was a virgin.

The patients I wish to report come in the same group as these reported by Schiffman.

The first was seventy-four years old. Her mother died at the age of eighty-five of carcinoma. The patient had had a plastic operation performed on the urethra for incontinence which had troubled her for from twenty-five to thirty years. Her menopause occurred at fifty-five. Her present complaint was lower abdominal pain which had been present for three or four months, especially on the left side where she noticed a mass that was getting larger. About three months before my visit she had a hemorrhage through the vagina and had spotted some since. She had had no discharge and no offensive odor. At times the pain radiated down the left leg.

Examination showed a fairly well-nourished, elderly lady, weighing 148 pounds. Bimanual examination showed a large irregular rounded mass about 6 inches in diameter, filling the left half of abdomen. It was quite firm, but in parts felt cystic and seemed to extend to a small mass on the right side. The uterus was made out with difficulty; it was separate from the mass, small and pushed forward. A sound introduced into the uterus went into the cavity a little less than 3 inches, confirming the evidence gained by palpation. Heart and lungs were essentially negative. R.B.C., 5,600,000; W.B.C., 8,000; hemoglobin, 80 per cent. Urine was negative.

Operation July 2, 1926 consisted of bilateral salpingo-oophorectomy and supra-vaginal hysterectomy. The carcinomatous ovary, tube, and uterus were removed first, and then the tube and intraligamentous cyst on the opposite side were excised. There was ascites present.

Convalescence was uneventful. X-ray treatments to the pelvis were started two weeks after the operation.

Pathologic report by Dr. B. S. Kline. Ovaries and uterus (the rest omitted). *Gross description:* Specimen consists of ovaries and fallopian tube; uterus amputated above cervix.

One ovary about 12 by 8 by 9 cm. presents a striking picture. It is apparently a cyst almost entirely filled with fleshy-firm, grayish-white masses. In places the grayish-white masses are observed extending not only into the capsule but through it. There is no appreciable necrosis of the tumor tissue.

The opposite ovary is composed almost entirely of a thin-walled cyst about 8 cm. in diameter. In one portion there is a small amount of ovarian tissue observed.

Uterus: Slightly enlarged. One section shows the chambers somewhat dilated. The endometrium shows numerous areas of hemorrhage at the surface. The blood vessels toward the perimetrium are more prominent than average. In places in the wall there are structures suggesting fibromyoma, not encroaching on the endometrium.

Microscopic Description; Tumor of the Ovary: Section shows typical papilliferous cystadenocarcinoma, with finger-like masses of stroma resembling ovarian tissue, lined by columnar epithelium, in many places heaped up, in many places unbounded by basement membrane and extending into the regional stroma.

Section 2 shows extension of the tumor tissue through the wall of the cyst with epithelial masses apparently within lymphatic channels. There are a moderate number of mitotic figures throughout the tumor tissue. In some areas the tumor has a glandular appearance.

Uterus: Section shows no appreciable abnormalities of endometrium although the glands are irregular in shape. In the wall there is a portion of typical fibromyoma with no degenerative changes. Adherent to the perimetrium there are tags of fibrous tissue.

Final Diagnosis: Papilliferous cystadenocarcinoma of the ovary, 12 cm. in diameter, with simple cyst opposite ovary. Chronic salpingitis (slight), with moderate hydrosalpinx. Fibromyomas of the uterus, few (small).

In November, 1927 the patient had a recurrence in the left pelvis. The mass was about 2 inches in diameter, movable, rather firm, and slightly tender. There was a serosanguineous discharge from the cervical stump. She had further x-ray therapy to the recurrent growth and radium was inserted into the cervical stump to control the bleeding and discharge there. The latter aim was accomplished, but the growth is now growing and the patient is losing ground rapidly.

Through the kindness of Dr. W. H. Weir I was able to examine the records of patients with carcinoma of the ovary operated upon on his service at Lakeside Hospital, Cleveland. From 1914 to 1928 there were 23 such patients, one of whom was colored. Of these there were 6 who had passed the menopause and only one of the six had a recurrence of uterine bleeding.

She (B. S.) was a spinster seventy-one years of age. Her symptoms were of six months duration and consisted of a drawing pain in the lower abdomen; a fullness of the entire abdomen, especially on the right side; rather marked indigestion

and constipation; tenderness in the lower abdomen, and finally vaginal bleeding, at times profuse and at other times scanty.

On examination a tumor mass filling the right lower abdomen was made out, as well as ascites.

Operation consisted of oophorectomy.

Pathologic Report; Gross: Specimen consists of tumor mass about 25 by 18 by 15 cm. There are large nodules of tissue adjoining one another, in some places translucent, in others, opaque, yellow-white. On section, the walls of the cyst are studied with translucent tissue varying from a few millimeters to 4 or 5 cm. in diameter. The content of the cyst is mucus, sometimes gelatinous. Microscopic examination shows large irregular acini, small cysts lined by columnar epithelium of either simple or stratified type. Acini contain granular debris and mucus. Stroma is congested. Other sections show greater proliferation of epithelium, but still an irregular papilliform arrangement.

Diagnosis: Papillary cyst adenocarcinoma of ovary.

Schiffman points out that these cases are of practical clinical and theoretic interest. The first question Schiffman raised is how often is postelimaeteric bleeding with negative findings a sign of carcinoma of the ovary.

The importance of this will be readily grasped if one agrees that early operation is the best means of curing cancer. Stübler and Brandess gave 76 per cent as the death rate from recurrences in the first year and 15.5 per cent in the second year. Three of Schiffman's cases were negative to bimanual examination, even under ether anesthesia. A slight enlargement of the ovary was made out in the fourth under anesthesia, and the fifth developed malignancy in a preexisting tumor. No surgeon, therefore, can pass lightly over a patient who complains of bleeding after the menopause even with negative findings. It is a question whether an exploratory operation is indicated when the examination is negative, but it certainly is if a slight enlargement of the ovary is made out, and all patients with bleeding recurring after menopause without demonstrable cause in the uterus should be suspected of harboring a carcinoma of the ovary.

Unlike cancer of the uterus the bleeding in malignant tumors of the ovary is slight and as a rule of short duration. In fact it passes off so quickly that the patient does not pay so much attention to it as with uterine malignancy and thus valuable time may be lost. Furthermore, although uterine bleeding may be present in carcinoma of the ovary, there is no foul discharge such as occurs with carcinoma of the uterus. As in Lahm's case it may simulate exactly a normal menstrual period.

The treatment, of course, is radical removal including the uterus. All statistics show the best results when hysterectomy was performed with bilateral oophorectomy. The danger of leaving one ovary is seen in reports of recurrence of malignancy in the ovary left at the first operation. Strassman has made a report of the results of his treat-

ment of 66 cases of malignancy of the ovary of which 52 were carcinoma. In only 4 was the growth limited to the ovary. Thirty-two of the cases had no postoperative radiation. Ten lived but one month, 5 lived for six months, 6 for ten months, 2 for fourteen months, and 9 were untraced. Of the 20 that were given postoperative radiation 2 lived for two months, 3 for five months, 2 for one year, 6 for two years, 2 for two and one-half years, and 2 had already passed the six year mark. This small series is favorable to postoperative radiation.

Furthermore it is obvious, from a study of ovarian tumors, that one cannot tell from the early clinical picture whether an ovarian tumor is benign or malignant or whether a benign tumor will assume a malignant character. In fact it has been pointed out that the pathologic picture and the clinical course do not always coincide. It is safe to say, therefore, that every ovarian tumor should be removed when it is diagnosed, and if malignant the opposite ovary should be removed at the same time, usually with the uterus. Hunt and Simon removed the malignant ovarian tumor only, in their patient, an infant of seventeen months, believing that there is not enough evidence to remove more when a malignant ovary is discovered in a patient so young. But in an adult there would be no question.

Theoretically the question remains, what causes bleeding from a senile uterus with a malignancy of the ovary? Fragmentary evidence is at hand which points to some explanation. Halban noted that some tumors of glands of internal secretion had a definite effect on sex characteristics. It has been seen that young girls before puberty with ovarian tumor were fully developed as far as secondary sex characteristics were concerned. The most recent account of such development of secondary sexual characteristics is contained in a report of a carcinoma of the ovary in an infant, aged seventeen months, by Hunt and Simon, and showed an abnormal development of the baby's breast and pubic hair. Furthermore, one month before they examined the baby she had had a slight blood-tinged vaginal discharge, resembling a menstrual flow.

Alessandri mentions the fact that even after complete removal of the thyroid for cancer hypothyroidism is unheard of if metastases are present, because the metastatic tumors function as the thyroid. Thus it may be assumed that the ovarian tumor may take on the function of the original tissue.

Schiffman suggests that the tumor may stimulate latent qualities in the remaining ovarian tissue, but adds, whether the postclimacteric ovary has such latent qualities is not known.

Lahm recently reported his case of a married woman, aged sixty, who began to bleed nine years after the menopause. She had never been pregnant. At operation he found a pseudomucinous cystic adenocarcinoma of the left ovary and a corpus luteum cyst of the right ovary and an adenomatous hyperplasia of the endometrium.

In his discussion he points to this cyst as a probable cause of the change in the uterine mucosa and the bleeding. He leaves open the question why this woman should have a fresh corpus luteum cyst in an ovary that had long ceased to function.

In my first case there was a small amount of ovarian tissue in the opposite ovary which contained a large thin-walled cyst and showed no signs of activity.

SUMMARY

Carcinoma of the ovary is a disease of late adult life.

Patients with primary malignant ovarian tumors show a high rate of sterility.

Removal of all ovarian tumors as soon as discovered should be the rule.

When carcinoma of the ovary originates after the menopause, it may be accompanied by uterine bleeding and rarely may show no other sign. Therefore, postclimacteric uterine bleeding, with no apparent cause, must be regarded as suspicious of ovarian malignancy.

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607 OSBORN BUILDING.

Kosakaô, J. Pharmacologic Research of the Action of Placenta Extract. The Japanese Journal of Obstetrics and Gynecology, 1928, xi, 27.

The author found that a hydrolytic extract of placenta produces contractions of the uterus in situ just as it does on the removed uterus. The extract also increases the tonicity of the intestines, and this effect is removed by atropine. Respiration is increased and the blood pressure is diminished by the extract, but when the experimental animal is pregnant or has recently given birth, the blood pressure is raised in most instances. As pointed out by Halban, the placenta stimulates the growth of the genitals and the breast glands. While this is true for animals, it does not hold for human beings. The contractions of the uterus produced by placental extract may not be specific because other organ extracts produce the same result. The best results are obtained when the administration of placental extract is combined with a pituitary preparation. The author attributes the results to stimulation of the parasympathetic system.

J. P. Greenhill.

EXPERIENCES IN THE MANAGEMENT OF PREGNANCY COMPLICATED BY HEART DISEASE*

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WHETHER or not to allow a woman with heart disease to go through pregnancy depends upon a prognosis. It demands a decision as to whether or not the heart will be able to supply blood for the physical demands of the later months of pregnancy and especially for the more strenuous effort of the hours of labor.

In the past the diagnosis of the anatomic lesion has been used as a basis for this prognosis, but to judge from the results it is not a reliable basis. Mackenzie pointed the way to a better understanding of the problem by focusing attention upon the symptoms and signs of failure of the heart to maintain a normal circulation. His observations and suggestions¹ published in 1921 were the first direct word from the internist to the obstetrician indicating the marked change in viewpoint which the modern ideas of cardiology have produced.

The prognosis for pregnancy depends upon the functional cardiac diagnosis, and this centers upon the patient's ability to perform physical exertion rather than upon the pathologic state of the valves or myocardium.

In this country and particularly in New York City, the idea of determining the limitations of the patient's heart by observing the reaction to physical exercise had obtained a firm hold, and in 1922 I was able to give the results of two years' experience with a functional classification of women with heart disease which it was hoped would indicate their fitness for pregnancy.² This classification depended upon three factors: First, that the patient definitely had organic cardiac disease; second, the ease with which unusual shortness of breath or palpitation developed after exercise; third, the observation of the patient's reaction to a rather strenuous test exercise given by the physician.

This preliminary report suggested that the method had some value as there was no instance of cardiac failure developing during pregnancy or labor in patients of the two groups considered most favorable. The experience of the last seven years has continued to show the value of a functional rating of the patients with heart disease. A functional classification has been introduced, under the auspices of The New York Heart Association, and this classification has come to

*Read before the Section on Obstetrics and Gynecology, New York State Medical Society, Albany, New York, May 23, 1928.

be widely used in many parts of the country. It seemed inadvisable to have a different classification for those cardiac patients who were pregnant and so the classification of The New York Heart Association has been used in our antepartum clinic at the Lying-In Hospital since 1924. This classification does not differ in principle, but only in the number of groups, from the one which I suggested in 1922. Patients with organic cardiac disease are divided into four classes according to their cardiac functional capacity.

Class I.—Those who are able to perform ordinary and usual physical activity without unusual fatigue, palpitation or dyspnea.

Class IIA.—Those who are able to perform the usual normal physical activity but who have discomfort in so doing. Such a person would have noticed an increase in shortness of breath after climbing stairs or after walking against a wind or up grades or after such things as housecleaning or lifting heavy articles. These patients would by some be said to be "fairly well compensated."

Class IIB.—Those who are unable to perform the more difficult features of ordinary physical activity without stopping on account of fatigue, shortness of breath or palpitation. Such activities would be climbing two flights of stairs or walking at an ordinary rate for a half mile. These patients might be called "somewhat decompensated."

Class III.—Those who are unable to perform the simplest physical activity without fatigue or shortness of breath or palpitation. Such a patient would be unable to walk 200 or 300 feet or to climb one flight of stairs without resting, and would be unable to do any housework. These might be said to be "much decompensated" or "definitely decompensated."

We have attempted to classify our antepartum cases along these lines using the patient's history of her ability to exercise as a guide and checking our rating by the observed reaction to a test exercise when the patient's history seemed unsatisfactory. Due allowance must be made for the normal limitation of ability to exercise which comes with pregnancy. The sickness of the early months may give rise to exhaustion and rapid pulse. In the later months there will be a shortness of breath on climbing stairs, not usually preventing the woman from climbing two flights, but making a pause necessary on the third flight. In doing her housework she finds it necessary to slow her pace somewhat.

Allowance must also be made for the fact that edema of the legs need not be due to heart disease. Many women whose hearts are normal show this during pregnancy.

In rating patients on their cardiac ability not only must these usual limitations of pregnancy be allowed for but also the individual variation found in different women. Some undertake physical effort with greater facility than others. Some women never can do much in the way of exercise but careful inquiry will discover that it is a sense of

fatigue rather than shortness of breath which limits their ability. In the absence of other signs this is not a symptom of cardiac failure.

The test exercise is of considerable help in doubtful cases, allowing the patient to swing a 10 pound dumb-bell, or a 5 pound dumb-bell if she is not well developed physically, from between the legs to straight overhead. She should do this 20 or 25 times, under the physician's observation and he should note the pulse rate and appearance of dyspnea directly afterward. A normal reaction will consist in a moderate amount of dyspnea and tachycardia which will subside in a minute or two. If the patient shows marked dyspnea or tachycardia the reaction is excessive and she should be classed as IIA or IIB. If the patient cannot perform this exercise on account of palpitation or dyspnea the reaction is so excessive that she should be classed as IIB. A Class III patient would probably not be able to perform more than 5 or 6 swings of the dumb-bell, but as a rule a test exercise is unnecessary for the functional diagnosis of a Class III patient. The subjective complaints and the appearance are usually sufficient.

I wish at present to report upon the results with a series of 106 patients seen in the antepartum Clinic of the Lying-In Hospital, between July, 1923, and July, 1925. All of them except two had rheumatic valvular disease and these two had congenital cardiac abnormalities. Twenty-nine were diagnosed as having mitral insufficiency. Sixty-four were diagnosed as having mitral stenosis. Eleven had aortic insufficiency and three of these probably mitral stenosis as well. One of the congenital cases was thought to have patent interventricular septum, the other patent ductus arteriosus. The functional classification of these patients is shown in Table I. Seventy-five were diagnosed as Class I, twenty as Class IIA and eleven as Class IIB. In addition to these 106 patients who were followed from the antepartum clinic, there entered the hospital during this two year period, six other patients with heart disease in a seriously decompensated state, three of them with pulmonary edema. These were Class III patients, five with mitral stenosis and one with aortic insufficiency. These patients appear in the last column of the table. The mortality in this group is striking, but the fact that three of these patients entered with such marked congestive heart failure that edema of the lungs was present shows a reason for this. Had these patients been under antepartum observation, it should have been possible to prevent their heart failure reaching such a severe grade. Their lives might have been saved and possibly also those of their babies.

Cardiac enlargement has been emphasized by some as an important feature for deciding upon the functional ability of the heart and especially the ability of the patient to withstand the strain of labor.

From this series it seemed to be of some importance (Table II) for cardiac enlargement was more than slight in eight (73 per cent) of the eleven patients who were rated as Class IIB, and who were definitely limited by shortness of breath and in only twelve (18 per cent)

TABLE I

	CLASS I	CLASS IIA	CLASS IIB	CLASS III
Mitral insufficiency	27	2	—	—
Mitral stenosis	21	8 ^a	6	—
Mitral stenosis and insufficiency	18 ^a	8	3 ^b	5 ^c
Aortic insufficiency	3	1	—	—
Aortic and mitral insufficiency	3	1	—	1
Aortic insufficiency and mitral stenosis	1	—	2	—
Congenital abnormality	2	—	—	—
Total	75	20	11	6

^aOne died of pneumonia after hysterotomy for dystocia.

^bOne died of heart failure after hysterectomy for heart failure.

^cTwo died soon after admission, another after treatment for forty days followed by vaginal section.

^dOne died after operation for gangrene of leg due to embolus of popliteal artery.

of the 64 patients who were rated as Class I, and who had no symptoms referable to their hearts. Class IIA patients who had slight symptoms of cardiac insufficiency showed definite cardiac enlargement five times in nineteen patients (20 per cent).

It will be seen from Table II, however, that enlargement is not a reliable guide. There were two patients with marked cardiac enlargement and this means the apex beat almost at the anterior axillary line, who yet had no symptoms referable to the heart (Class I), and ten patients with moderate cardiac enlargement were also in this category.

TABLE II

CLASS	ENLARGEMENT SLIGHT OR ABSENT			ENLARGEMENT MODERATE			ENLARGEMENT MARKED		
	I	IIA	IIB	I	IIA	IIB	I	IIA	IIB
Mitral insufficiency	19	2	—	3	—	—	—	—	—
Mitral stenosis	18 ^a	5	2	2	2 ^c	2	—	—	2 ^b
Mitral stenosis and insufficiency	13	7	1	1	—	2	1	1	—
Aortic insufficiency	1	—	—	1	—	—	1	1	—
Aortic and mitral insufficiency	1	—	—	2	—	—	—	1	—
Aortic insufficiency and mitral stenosis	—	—	—	1	—	—	—	—	2
Total	52	14	3	10	2	4	2	3	4

^aOne died of pneumonia after hysterotomy for dystocia.

^bOne died of heart failure after hysterectomy for heart failure.

^cOne died after operation for gangrene of leg due to embolus of popliteal artery.

The experience with this series gives added weight to the idea that a functional diagnosis of the cardiac patient is the most satisfactory available guide to the prognosis for pregnancy. To show the reasons for this it will be necessary to review in detail the case histories of the patients who died and in general the histories of those in the four functional groups.

Of the 75 patients diagnosed as Class I, 60 entered the hospital for delivery. There was no record of cardiac embarrassment during labor. One of these Class I patients died of pneumonia following a cesarean operation. This patient did not enter the hospital until labor had been in progress thirty-two hours. A hysterotomy was promptly done and the child found dead. No evidences of cardiac embarrassment were observed either before or after the operation. She developed pneumonia on the day after the operation and died on the fifteenth day.

Of 19 patients diagnosed as Class IIA, twelve entered the hospital for delivery. Five of these went through perfectly uneventful labors without noteworthy acceleration of the pulse or respiration. Three women showed slight pulse and respiration increase during and after labor with a varying amount of subjective dyspnea. All, however, made a prompt and uneventful recovery usually within twenty-four hours. One of these, para iv, after twenty-six hours in the first stage and two hours in the second stage, showed a pulse of 108 and respiration 22, with no subjective dyspnea. Another, a para v, had five hours of first stage and thirty-five minutes of second stage. She had a pulse of 118 and respirations 24 and complained of slight subjective dyspnea. The other, a para ii, breech delivery, had three hours and a half of first stage and fifty minutes of second stage. The pulse was 120, the respirations 22 and she complained of slight dyspnea.

Three were helped through the second stage by forceps after a long first stage, but showed no especial evidence of cardiac embarrassment. One of these, para iii, after twenty-five hours first stage and two hours second stage and a median forceps application, showed the pulse 104, respiration 22; another, para i, after fifteen hours first stage, four hours second stage, and a low forceps application, showed pulse 100, respiration 20; the third, para i, after sixteen hours first stage, one-half hour second stage and a median forceps application, showed pulse 100, respiration 20.

One woman with moderate nephritic manifestations, and hypertension as well as mitral stenosis, had a spontaneous premature delivery at the sixth month and during this showed the pulse 120 and respiration 28 with some dyspnea. In about thirty-six hours the pulse and respirations had returned to normal and she made an uneventful recovery. Another, a para xii, after a short labor without unusual pulse or respiratory acceleration, showed fever for a week and had occasional attacks of cyanosis and weak pulse during this time. A definite diagnosis was not made but pulmonary embolism was suspected.

One patient was delivered at another hospital.* She entered in labor and after a low forceps application was delivered of a four pound baby. The pulse and respiration were only slightly accelerated and she seemed in good condition. She had, however, cough and some dyspnea at night for a few days but improved and was allowed up in a chair on the tenth day postpartum. Next day she complained of a pain in the right leg and six days later gangrene of the leg was diagnosed and the leg was amputated for embolism of the popliteal artery. She did not make a good postoperative recovery and died on the twenty-sixth day postpartum.

Of eleven patients diagnosed as Class IIB, nine entered the hospital for delivery. Three of these went through without event; another had slight cardiac embarrassment. She was a multipara with twenty-seven hours in the first stage and two hours in the second, who showed the pulse 105 and the respiration 24 with slight subjective dyspnea. She made a prompt recovery, however, and was discharged in good condition. Another, after nine hours in the first stage and a version and breech extraction, showed no cardiac embarrassment but had postpartum hemorrhage with a pulse of about 100 for three days.

Two patients diagnosed as Class IIB in the clinic were later admitted to the hospital severely decompensated (Class III), one in the fifth month of pregnancy, the other in the third month. Both improved somewhat with rest and digitalis. The first patient who had entered with marked pulmonary congestion was operated on after fourteen days of treatment. Hysterectomy was followed by death on the second day. The second patient who had entered at the third month of pregnancy with only slight pulmonary congestion, had a hysterectomy on the ninth day and made an uneventful recovery.

Two patients were delivered by the cesarean operation, one after eighteen hours and the other after twenty-four hours of labor without progress. Both of these showed slight signs of circulatory embarrassment in an increase of pulse to about 120 and of respiration to 28.

Reviewing the results with these patients we find that the only deaths from heart failure occurred in the patients of Class IIB or Class III. The death in Class IIA was also a result of the heart disease and probably would not have occurred if she had not undergone the pregnancy. The death in Class I was a postoperative pneumonia and probably did not bear any definite relation to the heart disease.

Half of the twelve Class IIA patients went through labor with only the slightest signs of cardiac strain, as did five of the seven uncomplicated Class IIB patients. No patient diagnosed as Class IIA in the clinic entered the hospital severely decompensated as did two of the Class IIB patients. The two patients who had the cesarean operation

*The Lebanon Hospital, whose superintendent, Mr. G. E. Halpern kindly allowed the chart to be abstracted.

had a long period of labor before it in each case, and they stood the operation very well indeed. In one case the operation was done under local anesthesia.

There was a striking difference between the reaction of the women in Class I and those in Class II, A and B. The Class IIA patients appeared to have less cardiac distress on the average than did those in Class IIB, but individuals in either group showed so little reaction to the labor that it was hard to feel that their cardiac condition was variably severe.

One great difficulty in predicting the effect of labor lies, as has been said before,³ in the inability to predict the duration and severity of the strain of labor. With a short first stage and a short second stage, perhaps assisted by a low forceps application, there may not be much physical strain imposed on the heart. A long second stage is a severe strain on the heart. A much weakened heart might withstand a short second stage successfully, and a less weakened heart fail during a long one.

The seriousness of the occurrence of severe cardiac failure during pregnancy or labor is evident from the fact that of six patients in this condition, two died. The best treatment of severe cardiac failure is prevention and this means keeping watch during pregnancy for the appearance of increasing cardiac difficulty, appropriate treatment of the heart as soon as this is discovered and the interruption of pregnancy if the heart fails to respond to treatment after two or three weeks. If the woman goes into labor and during labor shows a pulse of 115 or respirations of 28 with subjective dyspnea or both of these, the condition should be considered as an emergency and any appropriate means applied to expedite delivery. In each case the obstetrician must decide what will combine the utmost speed with the minimum of cardiac strain. If an anesthetic is necessary, gas should be especially avoided, for this increases cyanosis and thus aggravates one of the symptoms of heart failure. Chloroform or ether is very well borne.

As a method of interrupting pregnancy, the cesarean operation has seemed to produce very little additional heart strain and to be preferable to hysterectomy from this viewpoint. This is especially so if the operation can be done with local anesthesia.

On the whole the grouping of these patients according to cardiac functional capacity seems to have a distinct value in helping to give a prognosis for pregnancy. A Class I patient will not be expected to give trouble from cardiac insufficiency. A Class IIA patient will probably not give trouble but there is a fair chance that a Class IIB will do so. The management of the Class III group is extremely diffi-

cult and the mortality is high. The main object of our antepartum cardiac observation is to prevent the patient ever becoming so severely decompensated as to fall into this group.

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160 EAST SIXTY-FOURTH STREET.

A MODIFICATION OF THE CLASSIC FORCEPS AND ITS APPLICATION

BY SAUL SEIDES, M.D., F.A.C.S., BROOKLYN, NEW YORK

IT IS generally recognized that force, excessive or misdirected, spells injury to the maternal soft parts and the fetal head. Injuries to the mother and baby may be caused also by an instrument which is ill-fitting or poorly constructed. The selection of the proper instrument for a given case is essential in order to obtain the best results.

The types of classic forceps in general use show marked variations in the extent of the pelvic and cephalic curves, the length of the blades, and the size of shanks and handles. They have the English lock so that when they are articulated and the handles approximated the space between the blades becomes irreducible. Because of these features the classic forceps can make a proper fit only with a head of definite size and shape.

The Kielland forceps has aroused a great deal of interest and discussion among obstetricians. Opinions differ as to its range of usefulness, advantages, and dangers. While it is in great favor with some, others, because of its tendency to encourage the "high forceps operation," unreservedly condemn it. The Kielland forceps is essentially a straight forceps, primarily designed for inlet applications. When the head is deeply engaged or stationed at the outlet the classic forceps with its full pelvic curve and shorter blade has the advantage over the Kielland forceps of conforming to the curve of the pelvic axis, and of avoiding undue strain and premature distention of the perineum. However, the narrower blades, the convex cushion-like inner surfaces, and the sliding lock of the Kielland forceps are factors that tend to minimize injuries to the maternal soft parts and fetal head, and contribute to the safety of instrumental delivery.

It occurred to me that a modification of the classic forceps which included the sliding lock and the other features above mentioned would furnish an instrument capable of greater advantages and bet-

ter results. Accordingly, I designed and had constructed the model described below. For the last two years I have used the new instrument almost exclusively with utmost satisfaction.*

The instrument is 38 cm. long. It has the full pelvic curve of the classic forceps; the distance of the apex from the horizontal is 7 cm. The widest diameter of the cephalic curve, when the forceps is locked and the handles parallel to each other, is 9½ cm.; and the distance between the apices is 2½ cm. The inner surfaces of the blades are slightly convex and the edges are well rounded. The lock is of the "sliding" type and is located slightly below the center of the shank of the left branch. The handles are so connected to the shanks that when the forceps is locked, there is a space of 1½ cm. between them. The shoulders, at the junction of handles and shanks, are concave and comfortably accommodate the fingers of the operator.

The introduction of the blades is performed in the usual classic way. The articulation is easily accomplished even when the blades are not on the same level, as occurs in cases where the head is in the

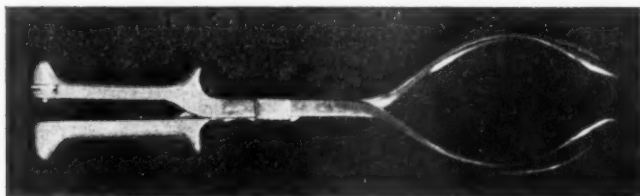


Fig. 1.

oblique position or where asynclitism is present. If this condition exists, no attempt is made at this time to correct it. As soon as traction is applied and the head straightens, the sliding lock permits the blades to shift and assume the proper level.

The extraction is conducted as follows: the right hand gets a purchase on the instrument in such a manner that the handles rest on the palm of the operator, the shank lying between the index and the middle fingers which are hooked over the shoulders. No compression of the handles with its obvious disadvantages is thus possible. Two fingers of the left hand (middle and index) are placed on the shanks to reinforce the right hand and also to direct the pull in the axis of the pelvis in the manner of Pajot's maneuver. When the operator releases the instrument, the handles automatically separate, thus avoiding compression of the head during the interval between tractions.

After the head has passed the bony outlet, its delivery over the perineum is conveniently accomplished by grasping the shank with the right hand so that the shoulders rest against the base of the thumb and index fingers, and directing the pull forward and upward. When the

*This instrument is made by Geo. Tleman & Co., New York.

wide diameter of the head reaches the vulval orifice the forceps are disarticulated and removed, and the head is allowed to be born spontaneously.

The advantages of the new model:

1. The pelvic curve of the forceps which conforms with the curve of the pelvic axis is of recognized advantage in medium and low forceps operations.

2. The sliding lock permits the widest diameter of the blades to be in steady contact with the largest diameter of the head. The head is held securely by the blades and slipping of the latter does not occur. It is also helpful when the head is in the oblique position and in asynclitism.

3. The special arrangement of the handles allows a snugly fitting application to a small head. By converging the handles the space between the blades can be reduced to any required extent.

4. Forceps-flare in advance of the descending and emerging head is negligible. Premature distention and undue strain of the perineum is thus obviated and the danger of lacerations of the soft parts is lessened.

4510 TWELFTH AVENUE.

A NEW DEVICE FOR PERFORMING MEDIAN EPISIOTOMY

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THE device, hereinafter described, suggested itself as a means of facilitating essentially painless median episiotomy in the perineal stage of labor when delivery is to be spontaneously accomplished, indication for perineal incision is present, and anesthesia is short of the surgical degree. Thus it will be seen that the field of usefulness for this instrument embraces a goodly percentage of spontaneous deliveries in primiparae and in many multiparae who have had previous perineal injury and repair. Lest a mistaken impression be gained, it should be stated clearly that this knife, with guard attached, is not recommended for perineal incision to the entire exclusion of scissors, for the latter are firmly intrenched for use in this connection, and cer-

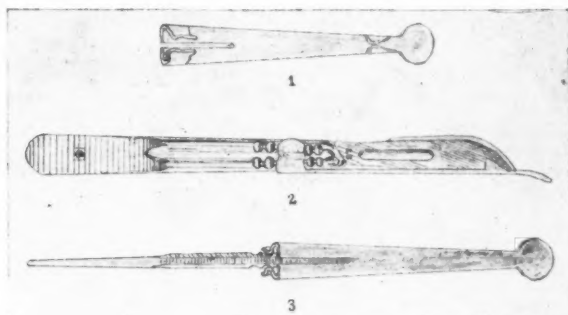


Fig. 1.—1, Anterior view of the knife protector. Additional spring effect is secured by the slot at the proximal end. 2, Side view of the assembled knife. 3, Posterior view of the assembled knife; this being the surface which comes into apposition with the advancing fetal head.

tainly should be used when anesthesia is complete and operative delivery is contemplated.

This knife protector or guard attaches to the Bard-Parker knife (number four handle and any of the blades 20, 21, 22, 23), and is made of a specially hardened phosphorus bronze material. It fits the knife snugly by means of spring clips attached to both handle and blade; the latter in such a fashion that the cutting edge is not encroached upon, as will be seen by reference to the illustration. While any of the above-mentioned blades may be used, experience has shown that the number twenty-two blade is preferable, owing to its larger and more rounded belly. At this point it should be emphasized that the reason for fitting this attachment to a standard knife with removable blade is to make constantly available a fresh, keen, cutting edge such

as is not afforded by the ordinary scalpel or scissors. With a dull blade the original purpose is defeated and the knife is practically devoid of merit.

With respect to the manner in which the assembled instrument is used, it can readily be seen by reference to the illustration that the tip is inserted within the vagina between the on-coming head and the distended perineum in such a manner that the blade is directed outward and downward. The knife is controlled with one hand while the other controls the head to prevent too rapid expulsion. The pressure of the head against the knife protector, together with a sweeping motion imparted by the knife hand, is utilized to make the incision, which is enlarged slightly with each successive contraction until the opening is sufficiently large to allow passage of the head without additional laceration. At times it may and does prove expedient to make the incision with a single sweep of the knife. Moreover, as the incision reaches the anal region and additional enlargement is required, it may be directed to one side without difficulty; in this event, anesthesia should be deepened as pain is experienced when the incision is carried away from the midline. It is for this reason that the knife cannot be employed in making lateral incisions unless complete surgical anesthesia is first induced. Pituitary liquid may or may not be used during the actual expulsion as seems indicated.

In a trial period extending over eight months this method has found a fairly liberal application by myself and by my colleague, Dr. William Cooley, and for a shorter period of time, by Dr. G. D. Royston of St. Louis. It has been used on patients who have received morphine-scopolamine, morphine-magnesium sulphate-ether, and the several inhalation anesthetics. Its advantages are that a keen cutting edge is always available; that perineal incision is accomplished under lighter anesthesia; that it is applicable in instances where insufficient room is available to permit the finger to act as a guard between knife and head; that trauma of tissues by the crushing action of scissors is obviated; that the wound possesses the virtues now quite generally ascribed to the median incision however made, namely, ease of repair, less postoperative discomfort and better anatomic result; and finally, that as a result of the lighter anesthesia required and consequent non-interference with orderly uterine contractions, the incidence of the low forceps operation is very materially reduced.

I wish to express my appreciation to Mr. V. Mueller, of V. Mueller and Company, Chicago, for his active interest in developing the finished protector from the original model submitted.

800 PEORIA LIFE BUILDING.

Society Transactions

CHICAGO GYNECOLOGICAL SOCIETY

STATED MEETING, APRIL 20, 1928

ABSTRACTS OF CASE REPORTS AND DISCUSSIONS

DR. MASSEL reported a case of **Abscess of the Wall of the Uterus with Hemolytic Streptococcus.**

Mrs. —, aged thirty, widow, white, was admitted to Dr. Baer's Service at the Michael Reese Hospital, Feb. 16, 1928. The patient was entirely well until about two weeks prior to admission when she rather suddenly developed a pain, dull and aching in character, in the right lower quadrant of the abdomen. This disappeared completely in two days, and was soon followed by sharp, knife-like pains in the left side with vomiting, 4 or 5 times within three or four hours and on the evening and morning before admission. Patient further stated that she had a "little" fever and chilly sensations, that her appetite was poor, that she was somewhat weak, and that there was some burning on urination but no frequency or nocturia, for the past two weeks. Bowels were undisturbed. Periods were always regular, twenty-eight-day type, lasting three days, moderate flow, and the last period was Feb. 1, 1928. She had one pregnancy in 1915 with a normal delivery and puerperium. The only illness recollected was measles when a child. She was never operated upon before. The remainder of the history was unimportant.

Physically, patient was a short, fairly well-nourished woman, who appeared to be acutely ill, with temperature, 99.8° F.; pulse, 104; respiration, 24; W.B.C., 8,800; sedimentation time, 15 min.; hemoglobin, 75 per cent; R.B.C., 3,730,000; blood pressure, 124/80. The abdomen was slightly tender in the right lower quadrant and markedly tender with increased muscular resistance in the left lower quadrant and otherwise negative. Cervix was high, firm, had many small lacerations, and was slightly resistant to motion. Corpus was anteflexed, firm, deviated to the right, and movable; right adnexa negative. A mass was felt to the left and behind the corpus, which was nodular, firm, extremely tender and moved with the uterus. The impression before operation was solid adherent tumor of the ovary with hemorrhage.

At operation the solid tumor proved to be a sessile fibroid, three centimeters in diameter; the left tube and ovary appeared acutely inflamed, and the sigmoid was adherent to the uterus just beneath the base of the fibroid. A subtotal hysterectomy, left salpingectomy and oophorectomy, and plastic on the denuded sigmoid were done. Dissection of the uterus revealed an intramural abscess about two centimeters below the left tubal cornu and at the point at which the sigmoid was adherent. The abscess was about a centimeter and a half in diameter.

Patient made an uneventful recovery, except for a small skin stitch abscess, which cleared up quickly; a slight vaginal discharge, which disappeared on the eighth day postoperatively, and the necessity for catheterization twice daily for thirteen days after the operation. Patient was discharged from the hospital on the twentieth postoperative day in excellent condition.

Cultures of the pus from the abscess cavity of the wall of the uterus showed the presence of the hemolytic streptococcus.

DISCUSSION

DR. J. L. BAER believed that some intrauterine manipulation preceded the development of this abscess, that an inoculation with streptococci accompanied this instrumentation and that the adhesion between the wall of the uterus and the sigmoid was a defensive reaction on the peritoneal side. He had expected to find colon bacillus in the uterine abscess, thinking it was a perforation of a sigmoid epiplocele. The presence of streptococci in pure culture seemed to justify the above-mentioned portal of entry.

DR. CAREY CULBERTSON said that the intramural abscesses reported in recent years have been described as infections during labor or the puerperium. Some years ago he saw an intramural abscess that was a real abscess of the tube, associated with gonorrheal salpingitis. At that time he also reported an intramural abscess that was found at autopsy in an elderly woman who died of diabetes and in association with the diabetes she had a large carbuncular abscess of the neck. Since that time he has seen one other intramural abscess in the horn of the uterus in association with gonorrheal pus tubes. Intramural abscesses seem in recent years to be exceptionally unusual.

J. E. MARKEE (by invitation) presented a paper on **Rhythmic Variations in the Vascularity of the Uterus of the Guinea Pig During the Estrous Cycle.** (For original paper see page 205.)

ABSTRACT OF DISCUSSION

PROFESSOR H. B. VAN DYKE said that one remark made by Mr. Markee is important: namely, that he had noticed no change in the size of the blood vessels. The procedure described supplies additional means not only of studying the influence of the ovarian hormone but of learning more of the physiology of the uterus. With respect to the estrus producing ovarian hormone, it is of course well known that uterine hypertrophy occurs after injection of this hormone into spayed animals; Mr. Markee's method makes it possible to follow such changes from day to day.

Observations can also be made on the pharmacology of the uterine mucous membrane without anesthesia which is responsible for more artefacts than is commonly realized. For example, the effects of epinephrin, pilocarpine, and atropine on the transplanted uterine mucosa can be studied. Such studies might also be of considerable general interest and supplement those which have been made of the visible mucous membrane.

PROF. G. W. BARTELMEZ said that those who are acquainted with the variations in the peristaltic contractions of uterus and tubes during the estrus cycle will appreciate the similarity between them and the vascular changes described by Mr. Markee. Both appear to be under the influence of the follicular hormone. The first question that arises is this: does the capillary bed of the whole body show similar rhythmic changes? He did not think that an answer could be given at the present time. To be sure nothing similar has been reported by Krogh and his followers in their studies of the capillaries, but none of them have studied so rich a capillary bed in mammals as the uterine mucosa affords. Other tissues which Mr. Markee has transplanted do not show the blushing and blanchings nor were they reported in the recent detailed study of the living human uterine mucosa by Schroeder.

If these vascular changes are specific for the uterus, we are confronted with an interesting question regarding the blood vessels of the transplant. Has a new set of vessels grown in from the iris which is specifically influenced by the tissue

it supplies? The alternative is that the original blood vessels of the transplant anastomosed with the iridial vessels and consequently persisted. Dr. Van Dyke has emphasized the other important feature of these "Schochet transplants," namely, their value for studying the effects of various drugs upon the capillary circulation.

DR. SYDNEY S. SCHOCHET felt that all the credit for this work justly belonged to Mr. Markee. If it can be conclusively proved that this rhythmic contraction is specific to the capillaries of the endometrium, it offers an explanation to the mechanism in which bleeding is controlled during menstruation. This problem offers a wide field for further investigation, as the anterior chamber of the eye is an ideal culture medium for tissue growth.

DR. JOSEPH L. BAER AND DR. RALPH A. REIS (by invitation) presented a paper entitled, **The Interposition Operation for Prolapse of the Uterus. An Analysis of 91 Consecutive Cases with Immediate and Remote Results.** (For original paper see page 233.)

ABSTRACT OF DISCUSSION

DR. W. C. DANFORTH said that his own feeling regarding the interposition operation is not as clear as that of Dr. Baer and his coworkers. Dr. Baer very clearly sets forth that the operation is not one to be applied to all cases of prolapse, and he brings out in his follow-up that his failures have all been in cases in which a marked degree of prolapse existed and in which the cervix and the uterus protruded. Based on the experience he had had with this operation covering a fair number of cases, it seemed to him that it was applicable to cases of prolapse which are associated with a marked degree of cystocele and in which the prolapse seemed moderate, that is, a prolapse in which a cervix of normal length did not protrude beyond the vulva or if it did, protruded very little. It seemed to Dr. Danforth that if the protrusion of the cervix of normal length extends beyond the vulva, the operation has not given as good results as some other methods. The essayist appears to have used it in 42 cases in which prolapse of the third degree existed with a remarkably small incidence of recurrence. He wondered, in listening to the paper, whether or not some of these did not have a rather elongated cervix so that the actual prolapse did not appear to be represented by a marked protrusion.

Dr. Baer stressed the importance of a thorough repair of the posterior vaginal wall. Dr. Danforth insisted that one should not do any interposition or any operation for prolapse without being sure there is a thorough repair of the relaxed posterior vaginal wall in cases in which relaxation existed, which he always does in operations of this sort.

The mortality rate of 1.1 per cent is very good. The mortality from shock, hemorrhage, etc., should be low. One of these patients reported died of embolism and Dr. Baer spoke of it as cerebral. He wondered if it were not a pulmonary embolism.

The catheterization record is very good. It seemed that 52 per cent required none. That speaks very well for nontrauma work.

Ninety-two per cent of success with any operation for prolapse, vaginal or otherwise, is excellent. The operation can be considered as one that has a very great place in slight prolapses which are not marked and where the cervix is coming down, previously associated with very marked cystocele, and lastly in women

in whom further childbearing is not desirable. His own experience with this operation is practically limited to women who are past the childbearing period. Of late he has used this method a little less often than previously. He has been a little more inclined to do an advancement of the base of the broad ligament to the bladder in some of the cases in which he formerly did a reposition.

DR. CAREY CULBERTSON said he felt like joining Dr. Danforth in the limitations that he has imposed upon himself for indications for this operation. The procedure was devised by Watkins as a cystocele operation and not as an operation for procidentia uteri. He felt that the limitations placed upon it by Watkins have not been followed by gynecologists and surgeons in general who have used it as a method of cure for procidentia. In his own work he has done this operation a considerable number of times, not as many as 91 per cent, but he has not done the operation in any case where the uterus came out or where the cervix came out unless the prolapse of the cervix was due to elongation. Where amputation of the cervix still left enough of the uterus to act as a support for the bladder, he had performed this operation in 2 or 3 cases and had taken care to fix the cervix in the posterior vaginal wall in association with transposition.

Another thing that he has carefully avoided in this operation is to use a uterus that is bleeding excessively for that purpose. That type of uterus should come out. There are only a few such cases. Dr. Baer speaks of metrorrhagia in 1 per cent and menorrhagia in 3 per cent.

As far as the size of the uterus goes, the majority of these patients are senile and the uterus is small. He had not found many cases where the uterus was too small for practical use beneath the bladder. In some cases he has not used it because he thought it was too large. In some cases where the uterus was large enough, he did the operation which Dr. Baer described and in association a fundal amputation. The point which Dr. Danforth emphasized regarding the fixation of the fundus to the pubes, he had not done, probably for the reason that he has not been struck with the importance of it, though it has been emphasized by Danforth, and by Baer. The results have been so good that he has been satisfied to follow in the way Watkins led.

He was rather surprised at the small number of cases in which there was urinary incontinence in this series. He expected more patients to show it.

The operation is usually referred to, as Dr. Baer referred to it, as the interposition operation. That was the name used by Watkins originally, but later he preferred the word transposition instead of interposition. He merely brought up this point of historical importance. As of further historical interest, the transposition of the uterus from the pelvis into the vagina was first done by Frank by bringing it out through the posterior culdesac for the purpose of closing fistulous tracts, rectovaginal, and vesicovaginal. Shortly after, Frank and Dürhssen separated the bladder from the cervix and brought the uterus forward. That was done for what was called in those days, vesical fixation of the uterus and was performed for retroversion of the uterus. This was an operation much like the operation that is now known as advancement of the bladder. Wertheim probably preceded Watkins in bringing the uterus into the vagina under the bladder, but he did not cover it with the vagina. He left it exposed. Watkins was the man who first placed the uterus under the bladder for the purpose of curing a cystocele and closed the vaginal wall over it. For that reason this should be called the Watkins operation, and he felt that the members of the Chicago Gynecological Society particularly should emphasize this point.

DR. N. S. HEANEY said that he has become more stringent in his indications for doing the interposition operation. Where there is an enormous cystocele, there is nothing as efficacious as the transposition operation, providing the uterus is not too low. He has limited this work almost exactly as Dr. Danforth has. Where the cervix protrudes from the vulva and this cannot be corrected by an amputation of the cervix, some other operation should be done.

DR. C. W. BARRETT said that he had given considerable thought and attention to the question of pelvic floor anatomy, especially to the condition and correction of redisplacement and prolapse. This tended to bring him more or less difficult cases. He tried to give to each patient the most normal condition that could be arrived at. One should try to think of the condition that these patients have before childbearing takes place, if they are constructed normally and not subnormally, because some patients have hernias here as well as in the inguinal region. It has been said that this operation is only applicable to patients where the uterus does not come outside. That is not a difficult condition to correct. It is the one where the uterus comes outside the vagina, between the patient's legs, that causes trouble.

DR. W. McI. THOMPSON said he wished to rise in defense of the Wertheim-Schauta operation. In 1902 as a student in Wertheim's clinic, he assisted in this operation and also performed the operation under the instruction of Wertheim's first assistant. It is very similar to the Watkins method. He stripped back the mucosa from the superior wall of the vagina. In drawing down the uterus volsella were used to climb hand over hand up the anterior wall of the uterus, until the peritoneal cavity was opened, when the position of the uterus was reversed. The posterior wall of the uterus was implanted under the bladder and the cornua sutured to the lateral ligaments, the serosa being first stitched to the back of the uterus.

One idea which Wertheim and later Howard Kelly suggested was the reduction of the body of the uterus when too large to implant under the bladder. This was done by splitting the uterus down the center and taking out a wedge to reduce it to the proper size, or the enucleation of fibroids for the same reason.

Another suggestion in handling cases where the transposition operation has been performed with amputation of the cervix is to cut a hole through the fundus and leave a drain in situ until a fistula forms, so that the menstrual discharge can flow through this artificial opening in place of through the cervix.

DR. CAREY CULBERTSON, in answer to Dr. Danforth, about fixing the cervix posteriorly, said that this was one of the problems which Dr. Watkins also attempted to solve so that he could use this operation in case the cervix was prolapsed. He attempted to solve it when he had the vaginal wall laid open by bringing forward the uterosacral ligaments. Jellett also has described a method of shortening the uterosacral ligaments for the same purpose of holding the cervix back toward the sacrum. Dr. Culbertson said he did not know how to keep the cervix back until he had a patient with a cystocele in whom the cervix did not come out. He thought it would be a proper case for a Watkins transposition operation. When he sat down to perform the operation, he discovered that as a result of some preexisting, probably inflammatory condition in the posterior vaginal wall, the cervix was fixed there deep in the posterior vault very nicely. He did not disturb that fixation. The patient did so well and the result was so satisfactory that he subsequently made this fixation in two other cases artificially. In procidentia it is the upper portion of the vagina that comes down rather than the lower and it is only in third degree procidentia where the entire vagina comes out, where it becomes detached from the white line. He is satisfied, however, that such fixation of the cervix to the posterior vaginal wall would not be advisable in every case.

DR. L. E. FRANKENTHAL asked Dr. Culbertson if he was familiar with the Kielland operation. Kielland splits both the anterior and posterior cervix, undermines them and makes a small strip down the posterior wall of the vagina and buries the cervix.

DR. CAREY CULBERTSON said that the thing that is done at these operations to hold the cervix up is a perineorrhaphy, as Dr. Barrett emphasized. The whole vagina should be narrowed, as Dr. Baer explained, instead of making another hole in the pelvic floor.

DR. BAER, in closing, said he held no brief for the transposition operation. His object in presenting this statistical analysis was to analyze the results obtained with a particular kind of operation in an institution where a group of men are doing similar technical procedures. In a subsequent paper which will be read shortly, eleven types of operation proposed for the cure of prolapse will be analyzed and that paper likewise will not be a defense of the eleven types but again a presentation of the results of each of them and a comparison of their relative merits.

As to the limitations in the choice of patients, that must be an individual matter. The gynecologist who acquires a certain deftness with a given procedure is certain to get better results with that procedure than a man who uses that identical procedure only occasionally; the more often he carries out that particular technic the more likely he is to continue to get better and better results, so that use and repeated use has its value even with an operation that may have lesser mechanistic merit.

The size of the corpus does play a part in utilizing it anteriorly under the bladder. The women who come in with prolapse come either at or before the menopause, that is, in the fourth or fifth decade, or they do not come for another twenty years until their pelvic tissues are rather atonic, that is, in the sixth or seventh decade; nevertheless, it is not so that most of these elderly women have atrophic, senile uteri. The larger number have a fairly sizable uterus which can be utilized in the anterior vaginal wall. The objection to implanting a smaller uterus is that there may be a recurrence of the cystocele.

Constipation can be due to diastasis of the levator ani. It can be due to distention of the rectal ampulla. That constipation of this type can be cured much better by a pelvic floor reconstruction than by administration of medicine is likewise true.

Dr. Barrett holds to anatomic reconstruction and that is an excellent position to take, one at which we all aim, and yet the ultimate object of the physician is to relieve the patient permanently of the symptoms present.

The surgeon who collapses a chest wall because of an intractable empyema or a tuberculosis, is not restoring the parts to their normal anatomic condition, yet there seems to be a unanimity of opinion that collapse of the chest wall has produced cures in cases that were theretofore intractable. So, too, with hernias of the uterus and bladder. The symptoms may be relieved permanently even though the anatomic relations may be disturbed.

DR. GEORGE FIELDING HIBBERT (by invitation) presented a paper entitled, **Protein Therapy in Gynecology**. (For original paper see page 227.)

ABSTRACT OF DISCUSSION

PROFESSOR W. F. PETERSEN said that unfortunately his experience has been limited to other conditions. There is no doubt from the literature that the closed gonorrheal infections in men are influenced by therapy of this type. He

presumed that one should have a larger series of cases of the same type to determine ultimately the real value of the treatment. The difficulty is that physicians think all patients react alike. All patients do not react alike. In an injection of this sort one has a wide variation, just as one has a wide variation from adrenalin injections. One must keep in mind that the reactivity of the person is decidedly influenced by the infection from which he is suffering. Then one must keep in mind that the material injected plays a very large part, so that one can have all varieties of effects from psychic effects down to the most severe shock reactions. Even the very mild effects from intracutaneous injections sometimes give a therapeutic result.

The essayist pointed out that the primary result is one of stimulation. That is probably correct. It should, perhaps, be emphasized that the primary reaction is a capillary reaction; the capillaries react more definitely and more violently to some stimulants. Following the primary reaction there is a reversal—a biologic rest phase sets in with an effect on the individual as a whole. In the period when the temperature recedes, inflammatory reactions are lessened, depending on the dosage. He pointed out that in puerperal infection with a marked inflammatory reaction, with high fever, larger doses are sometimes used with success. These are the type of cases which Kraus first tried when he treated puerperal infection by intravenous injection. On the other hand, the chronic infections such as were described tonight very frequently do better with small doses.

He emphasized one thing, namely, that human beings are relatively resistant to anaphylactic shock; secondly, that milk seldom gives rise to anaphylaxis. In the hundreds and thousands of cases that are reported in the European literature, one can find only 3 or 4 cases of shock. If treatment of this sort is instituted, it should be done with good judgment, and the type of reaction should be carefully ascertained by clinical observation.

DR. A. G. GABRIELIANZ said that Aolan treatment is quite free from anaphylactic shock. In nearly ten thousand injections there was no case of shock. There were 82 per cent good results, which is a high percentage when compared to the results obtained from operations which are done very widely in most of the big clinics. It is interesting to compare the operation in America and in Europe. In Europe the operations in chronic pelvic infections were attended with a high percentage of deaths. In America the percentage is very low, 1 or 0.5 per cent, because of difference in virulency of germs. After operation most of the patients complain of pain, nearly the same pain as they had before. Some authors state that 50 per cent of the operations do not relieve the pain. To compare with protein therapy 82 per cent and 50 per cent is very good. Every patient should first be given protein therapy and if that does not help, operation can be resorted to.

The dosage is different. Many authors use 10 c.c. of Aolan. Experience shows that 7 c.c. twice a week gives much better results than 10 c.c.

After operation most of these patients have subjective symptoms. Bimanually it is found that a good many operative patients in from five to six weeks after operation will have an area of infiltration which is very painful on examination. Those patients when treated by protein therapy usually have successful results. Small areas of pelvic infection and infiltration of the sacroiliac ligaments do not respond so well to protein therapy but respond very well to diathermy. Many physiotherapists do not know much about gynecology, and it is well that the gynecologist states what kind of treatment he wishes. If the patient has sacroiliac infiltration, very good results can be obtained from diathermy.

It is necessary to mention the action of the reticulo-endothelial system in nonspecific protein therapy. The cells of the reticulo-endothelial system have

phagocytic power and take care of germs, as well as their toxin. The cells can be found in peripheral blood in the form of monolymphocytes. Especially rich in these cells are liver, spleen, lungs, bone marrow, and subcutaneous tissue. As Saxl states, the subcutaneous tissue contains reticulo-endothelial cells in form of histocytes, having migrating power and partly converting into monocytes in circulating blood.

DR. C. W. BARRETT said that in the large number of cases of infection encountered at the Cook County Hospital, marked changes take place in patients with pelvic masses in a much shorter period of time than those without this type of treatment. He thought a little care should be taken in drawing conclusions from what was shown in one year and compared with what might be expected without this treatment. At the County Hospital patients come in with a temperature of from 101° to 103° F., and there is no difficulty in bringing the temperature down to normal in a week or ten days; and in many cases where the inflammatory mass has its origin outside the tube the patient does so well that she is perhaps able to bear a child again in the course of a year. It is a question whether this treatment would be the best for pus tubes. Of course the mortality can be made very slight. As to pain in these cases, the pain is mostly present during the activity of the process. When the activity ceases, they are so free from pain that they often want to go home, even though large masses are present.

DR. HIBBERT, in closing, said in regard to the point brought out by Dr. Peterson that there was an individual reaction in connection with the protein therapy; it was found that there were persons who did not respond and therefore protein therapy cannot be used as a routine treatment of these cases. That is perhaps one of the reasons why the general practitioner and many more in gynecology who have used protein therapy have not obtained the results that they should. It is not a routine treatment. As brought out in the paper, there are often pathologic conditions associated with true inflammatory cases that may change the entire picture so that operation may be indicated almost at once, that is, if the inflammatory condition is of the subacute type and it would not endanger the patient's life to open the abdomen. Where there is a simple or relatively simple mass in the pelvis, those patients do respond to treatment in a varying degree. This brings out the point that it is an individual treatment and cannot be generalized.

In connection with the treatment he uses alkaline douches, the knee-chest position, and a bland diet. All these cases have been on general routine management, including vaginal tamponades and other methods and have not responded to treatment. That is why they were put on the Aolan treatment.

Dr. Hibbert agreed with Dr. Barrett that rest in bed with an ice-bag will bring down these masses in the abdomen, and the patient will be able to leave the hospital or get out of bed at home. The point is, how many dispensary patients will do that? They may be told to stay in bed, but they go home where they have five or six children and they cannot stay in bed. The family conditions do not warrant rest in bed.

In answer to Dr. Culbertson's question as to the kind of milk he used, he said that when the patients came into the dispensary they were asked to purchase an ampule of Aolan. He used that form of protein therapy because of its accessibility and its relatively low cost to the poor patient. He did not use boiled milk.

In answer to Dr. Schochet he said he did not do the sedimentation test.

Department of Reviews and Abstracts

CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

COLLECTIVE REVIEW

THE SECOND INTERNATIONAL CONGRESS OF RADIOLOGY AT STOCKHOLM, JULY, 1928

A RÉSUMÉ OF IMPORTANT PAPERS RELATING TO GYNECOLOGY

BY ARTHUR STEIN, M.D., F.A.C.S., NEW YORK

(Associate Gynecologist, Lenox Hill Hospital)

IN JULY, 1928, there was held in Stockholm the Second International Congress of Radiology, which was, as might be said right at the start, a perfectly conducted meeting.

Weeks in advance of the meeting a program containing abstracts of all the papers to be read were in the hands of the members of the congress, and at the beginning of the same a book containing the photographs as well as a short description of the medical curriculum of each member was distributed.

The meetings were held simultaneously in five different rooms in the beautiful new parliament building opposite the royal palace. It was possible to know exactly what was going on in each room through a bulletin board in every room which was changed constantly so that one could easily orient oneself as to the speakers and papers being presented in the other rooms at any given time.

All of the meetings started at 8:30 A.M. and lasted until 10:30, and again started at 2:30 and lasted until 4:30 P.M. Each speaker had ten minutes at his disposal in which to read his paper. Here was a splendid example of how a congress really should be conducted and it might well be imitated by all other congresses.

A demonstration was given showing how much could be done in a short time when the "Radiumhemmet" was given over one morning to report its achievements. At this time Forssell and nine of his able assistants gave their results during the last fifteen years in the short space of two hours. This report was a revelation in brevity and exactness.

At a special meeting there was a discussion as to the training in medical radiology, and it was shown that Sweden leads all other countries in this subject, having already three chairs for this specialty.

On the last day of the congress there was a demonstration of different types of treatment at the "Radiumhemmet," which unfortunately I could not attend. I know, however, that the external radium treatment with very strong radium preparations has been found to be of increasing value.

Admiration for the splendid arrangements and for the way in which the congress was conducted was adequately expressed by the dele-

gates from the European as well as the North and South American countries at the end of the morning session at which the gentlemen from the "Radiumhemmet" (radium institute) gave their reports.

In closing these general remarks I would like to mention the splendid reception the members of the congress were given by the city of Stockholm, consisting of a really unusual dinner and dance arranged by the city at the beautiful new city hall.

All in all the congress was a memorable event, due mainly to the great efforts of Professor Forssell and his also justly famed assistant, Dr. James Heyman.

RADIUM TREATMENT AT "RADIUMHEMMET"

Of particular interest was the report by Dr. James Heyman on the technic and end-results of radium treatment for cancer of uterus and ovaries at "Radiumhemmet," in Stockholm. Unfortunately, the darkness required for lantern demonstrations made it impossible to take notes and this article has not yet been published; but from my recollection and Heyman's previous articles, the technic and results may be described.

In Stockholm a complete follow-up study can be made of all cases. Heyman's report is based on end-results in 100 per cent of the cases treated. The "Radium Home" is controlled by the Swedish Government, and all patients are required by law to report when requested. In the case of poor patients living outside of Stockholm, the Government pays the traveling expenses. For this reason, Heyman's follow-up study is much more complete than would be possible in the United States.

Heyman's technic includes three treatments with radium salt, the second one week after the first and the third three weeks after the second. The radium is introduced into the uterine cavity and packed against the tumor surface in the vagina. Twenty-two hours of exposure and the same amount of radium are used in each treatment. The total dosage for the three treatments is about 2,400 mg. element hours in the uterus and 4,500 mg. element hours in the vagina. A heavy filtration, equivalent to 2 mm. of lead in the uterus and three to four in the vagina, is employed.

In the "Radium Home" the combined use of roentgen rays and radium has been abandoned, because the results proved better when radium was used alone.

When the glands, bladder, or rectal wall are involved or the tumor is fixed by involvement of the parametrium, Heyman considers the case inoperable. Movable tumors without involvement of the bladder, rectum, or glands are considered operable.

About 1920, Heyman states, the leading gynecologists of Sweden gave up operating for carcinoma of the cervix. As a result, more operable cases were submitted for radium treatment; but, even as late as 1921, the inoperable and borderline cases constituted 63.5 per cent of the total.

In a series of five hundred cases of cancer of the cervix treated with radium from 1914 to 1921, 112, or 22.4 per cent, were free from symptoms five years after treatment was begun. Clinical healing resulted and persisted for at least five years in 47.6 per cent of the 145 operable

and borderline cases. In a series of forty-six cases of cancer of the body of the uterus treated from 1913 to 1921, twenty patients, or 43.5 per cent, were free from symptoms after five years. The average figure for surgical cure in such cases is 42.8 per cent. In operable cases of cancer of the uterine body there were 60 per cent of five-year cures at the Radium Home; in this type of case, surgery yields 58.8 per cent of five-year cures.

OTHER REPORTS ON RADIOTHERAPY FOR CANCER OF THE UTERUS

B. Archanguelsky, of Moscow, presented a statistical review of the results of radiotherapy and surgery in 5,092 cases of cancer of the female genitals treated with radiotherapy and 482 cases treated surgically. These cases were collected from the literature. As a criterion of "cure" he adopted the rule of Winter and Regaud; i.e., complete absence of all symptoms of cancer five years after treatment. On this basis, he found that 37.7 per cent of operable cases of cancer of the female genitals treated surgically and 41.5 per cent of those treated by radiotherapy had five-year cures. In operable cases of cancer of the cervix, 35.3 per cent of those treated surgically and 41 per cent of those treated by radiotherapy had five-year cures. In operable cases of cancer of the corpus uteri, surgery gave 46.4 per cent of cures and radiotherapy 48.4 per cent. In borderline cases of cancer of the genital tract, as a whole, surgery showed 5.2 per cent of cures; radiotherapy, 23.8 per cent. In cervical cancer belonging to this group, surgery gave 5.4 per cent of cures; radiotherapy, 25.6 per cent. In cancer of the corpus uteri belonging to this group, there were no cures in cases treated surgically; 23.8 per cent, in those treated by radiotherapy. In the borderline cases, therefore, the value of radiotherapy is especially evident. In cases of the third and fourth groups, the inoperable and "hopeless" cases, surgery failed entirely in all cases of cancer. In inoperable cases radiotherapy gave 9.1 per cent of cures in cancer of the genital tract as a whole; 9.8 per cent, in cancer of the cervix; and 6.1 per cent, in cancer of the corpus uteri. In the fourth group, "hopeless" cases, 1.5 per cent of all cancers of the genital tract were cured, and 0.3 per cent of those of the cervix uteri. Radiotherapy, therefore, evidently gives better results than any other method of treatment in inoperable cases.

G. Gambarow, of Tiflis, North Georgia, Asia, reported on the treatment of more than five hundred cases of inoperable cancer of the cervix uteri with radium from 1914 to 1923, partly at Moscow and partly at Tiflis. For the first part of this period (at Moscow 1914-1919), no definite statistics were available; but the results were favorable in that marked improvement or complete relief from symptoms was often observed, and a few cured cases (no recurrence after five years) were recorded. In the second period (at Tiflis 1920 to 1923), 104 cases were treated, with five-year cures in six cases, or 5.7 per cent. In this series, as a whole, immediate improvement followed treatment; i.e., cessation of bleeding, relief of pain (often complete), cessation of the foul discharge, and improvement in the general condition. Gambarow's technic is as follows: Radium tubes of 50 mg. are placed in the uterus for twelve to fourteen hours. This treatment is repeated five to seven times at one to two-day intervals, with a total dosage of 3,000 to 4,900 mg. hours. Gambarow concludes that radium

treatment is the only method that gives relief in inoperable cancer of the uterine cervix and that in a small percentage of these cases it results in cure.

P. Strassmann, of Berlin, reported that he had treated about 1,100 cases of cancer of the uterine cervix with radium or mesothorium since 1913. The first application of radium was made to the portio vaginalis, or at most in the cervical canal. This method reduces the chance of infection, and later applications can be made higher. One application is made within the corpus uteri. Each application is made for not more than twelve hours. It is repeated every third day until a total dosage of 2,000 to 3,000 radium element hours has been given. After an interval of four weeks, the glands are treated by deep roentgen-ray irradiation. Another series of treatments is given only if the first series was too short or if there is recurrence of bleeding. The primary mortality from such radium treatment is nil, and it results in greater prolongation of life than operation in carcinoma of the cervix. In carcinoma of the corpus uteri, intrauterine application of radium is used in women over sixty years of age; others are operated upon by the vaginal route.

W. Lahm, of Chemnitz, Germany, reported the results of treatment of carcinoma of the cervix uteri with radium or combined radium and roentgen-ray irradiation at the Woman's Clinic of Dresden. From 1915 to 1923, 469 cases were treated with 109 five-year cures, or 23.5 per cent. From 1915 to 1923 treatment with radium was used predominantly. It was found that the results depended upon the dosage. In Group 1 (early cases), 50 to 60 per cent of cures were obtained with 3,000 to 6,000 mg. hours; in more advanced cases (Groups 2 and 3), the optimum results were obtained with a dosage of 8,000 to 10,000 mg. hours. The optimum dosage must be given within three to five weeks; the maximum dosage did not exceed 13,000 mg. hours. With combined radium and roentgen-ray irradiation, which was used chiefly from 1921 to 1923, the dosage also must be carefully regulated to obtain the best results. The combined method improved the results in the more advanced cases (Groups 2 and 3); in the early cases, careful radium treatment gave the most satisfactory results. The maximum dosage with the combined treatment was 5,000 to 7,000 mg. hours of radium applied in the cervix and 600 to 1,000 R units of roentgen rays over the pelvis.

The prognostic value of histopathologic groupings in cases of carcinoma of the cervix, on the basis of five-year end-results, was studied by H. Schmitz, of Chicago. The cellular types, the degree of regularity or irregularity of the cells and their nuclei, the functional activity, chromatinosis, distinction or indistinction of the cellular wall, and mitoses were examined and rated from 1 to 4. The sum of these results was termed "the malignancy index." A plan of grouping according to clinical findings was also formulated. From a study of Schmitz's results, the histopathologic and clinical groupings would appear to be of definite prognostic value and also to furnish a guide as to the particular type of treatment to be selected.

RADIATION THERAPY FOR UTERINE MYOMAS

E. Zweifel, of Munich, noted that the treatment of uterine myomas by irradiation is on a much more secure basis than that of uterine carcinoma: The results of the treatment in myoma are known within

a few months, while in the case of carcinoma several years' observation is necessary to determine results correctly. Zweifel reported that at the Woman's Clinic of the University of Munich 846 cases of uterine myoma were treated by roentgen rays from 1913 to 1926. Results with the earlier series have already been reported. From 1920 to 1926, 408 cases were treated, of which 236 were traced. In 228 of these 236 cases complete amenorrhea resulted from the treatment; in seven cases menstruation began later, but the patients were free from all symptoms; in thirteen, or 6 per cent, of these cases treatment failed to relieve symptoms; in six of these cases the diagnosis proved to be incorrect (ovarian tumor); in one case a polyp of the uterine mucosa explained the persistence of bleeding; in three cases carcinoma was later found to be present; in two cases there was degeneration of the myoma; in only one case could no reason for the persistence of symptoms be found.

A. Bécélère, of Paris, stated that myomas of the uterus are distinguished from all other neoplasms by their close relationship with the ovaries and the most manifest sign of ovarian function, menstruation. Roentgen irradiation, outside of its effect on ovarian function, has no direct action on the myoma. This is shown by clinical observation and the effects of treatment when, as occasionally occurs, the myoma begins to grow after the natural menopause. The menopause obtained by roentgen-ray treatment does not differ in its symptoms from the natural menopause. There is a wide variation in the intensity and duration of symptoms in different women. The characteristic symptoms of the menopause do not depend upon the cessation of the monthly flow of blood, considered as a means of excreting toxic substances; for in cases in which the cessation of menstruation is temporary these symptoms disappear at least two weeks before the recurrence of the menstrual flow. This disappearance of symptoms is often sudden and is the first sign of returning ovarian function. It is usually accompanied by a recrudescence of growth in the myoma. Further treatment results in regression of the myoma and recurrence of the symptoms of the menopause, indicating suppression of ovarian function. When the ovaries have ceased to function, after roentgen-ray treatment of myomas, they may become cystic and necessitate operation.

RADIOTHERAPY FOR CLIMACTERIC HEMORRHAGES

II. Runge, of Kiel, Schleswig-Holstein, discussing the treatment of hemorrhages at the climacteric, points out that roentgen-ray castration is not a suitable method of treatment for all types of excessive bleeding. Such treatment is indicated only in those cases in which the bleeding is too severe or too frequent but there is a regular menstrual flow without bleeding in the interval. In such cases roentgen-ray treatment is indicated, whether bleeding is due to uterine myoma or not. The periodicity of the bleeding in any case indicates that it is due to shedding of the endometrium during the menstrual period. When the bleeding is irregular or constant, it indicates that the cause is not due to disturbances of menstruation resulting from changes in the ovarian cycle. In such cases examination of the uterus and curettement are necessary to determine the cause such as incomplete abortion, carcinoma, polyp, submucous myoma, etc., none of which is influenced by roentgen-ray treatment. The frequent pathologic change

in the climacteric described by Schröder as metropathia hemorrhagica, which is due to cystic hyperplasia of the mucous membrane, is also not amenable to roentgen-ray treatment until after the uterus has been curetted. Then the reaction of irradiation is satisfactory. In 204 cases of this type so treated, there was a recurrence in only two cases. With proper selection of cases good results from roentgen-ray therapy are to be expected in practically 100 per cent of cases of hemorrhage in the climacteric. Without such selection, many failures are inevitable.

UTEROSALPINGOGRAPHY

C. Heuser, of Buenos Aires, discussed radiography of the uterine cavity with lipiodol and claimed priority in this method, stating that his first report appeared in 1921 and that Wintz, of Germany, and Bécélère, of France, did not report their work until 1925. The procedure is useful in the diagnosis of deformities of the uterine cavity by abnormal growths, such as placental rests and tumors; in the diagnosis of pregnancy; in distinguishing between fibroma and pregnancy; in various pathologic conditions in the uterine cavity, variations in position, etc.; in determining the form, position and size of the lumen of the fallopian tubes; in the diagnosis of diverticula of the tubes; in determining the condition of the tubouterine sphincter and various modifications that may cause pelvic infections; in the diagnosis of tumors of the tube; in determining causes of sterility of uterine or tubal origin; in the diagnosis of uterine deformities, bicornate uterus, infantile uterus, etc.; and in determining the conditions of muscular contractility of the uterus and tubes. The procedure is without ill effects if proper precautions are observed.

Bécélère reported that he had used lipiodol for the roentgen-ray examination of the uterus and tubes in more than 150 cases without the slightest ill effect, even in 40 cases of salpingitis. To obtain satisfactory results, it is necessary to block the cervix well, to inject the lipiodol under pressure, and to control the pressure by means of a manometer. The radiologic examination should include fluoroscopy, radiograms from the front and sides, and control examination the following day. Indications for the use of this method include the following: Study of the permeability of the tubes in cases of sterility and salpingitis and for the differential diagnosis between appendicitis and salpingitis; differential diagnosis between fibroma and cyst; and study of metrorrhagias for early diagnosis of cancer of the uterus. The only contraindications are pregnancy, fever, and severe hemorrhage.

J. Iribarne and N. Capizzano, of Buenos Aires, stated that they use salpingography with lipiodol in all cases of sterility. In some of these cases the injection of lipiodol was sufficient to remove the obstruction from the tubes and conception occurred shortly after the examination. In others a second injection of lipiodol was necessary after treatment with diathermy or high frequency currents for the pathologic condition in the tubes.

By means of hysterosalpingography following the injection of iodized oil, S. N. Bakke, of Bergen, Norway, observed that the direction of peristalsis in the fallopian tubes is away from the uterus and toward the ostium abdominale. When iodized oil was injected into the ampulla of the tube during operations for chronic appendicitis, it was ejected into the peritoneum in exactly the same manner as when intro-

duced into the uterus. According to Bakke's observation, the uterus after the injection of iodized oil empties itself partly through the fallopian tubes into the peritoneal cavity and partly through the cervix into the vagina. These findings are contrary to those of Kok and Mikulicz-Radecki in 1926, who reported that in surviving fallopian tubes the direction of peristalsis is from the ostium abdominale to the uterus.

G. K. F. Schultze, of Berlin, illustrated his findings in hysterosalpingography, showing that with an opaque medium the motility of the female genitals can be demonstrated in four typical phases. Physiologic and pathologic variations occur, owing to differences in technic and functional and anatomic conditions. The roentgen-ray technic must be such as to show all these anomalies and the difference between physiologic and pathologic abnormalities under optimum conditions.

PYELOSCOPY

A. Leb, of Graz, Austria, reported that since 1923 he had used pyeloscopy as an aid to the diagnosis of renal and ureteral disease. In the course of the fluoroscopic examination with an opaque medium, manual pressure on the abdomen is employed. Pyeloscopy by this method has shown that purely functional disturbances of urinary excretion with anatomically healthy kidneys are usually due to neurologic conditions of extrarenal origin. When the pyelographic findings are of uncertain significance, pyeloscopy may establish the diagnosis by showing a constant change on examination in various diameters. Pyeloscopy has proved itself to be of value in diagnosis, as shown by verification of the findings at operation in many cases in the following conditions: demonstration of functional disturbances in anatomically healthy kidneys, such as paresis of the musculature of the renal pelvis by injury to the lumbar and sacral vertebrae; spastic changes in spina bifida occulta, etc.; diagnosis of conditions leading to the establishment of hydronephrosis; hyperkinetic emptying of the kidneys; diagnosis of malignant tumors of the kidney by clearly demonstrating filling defects that are constant; differentiation between inflammatory conditions and renal tumors by demonstrating differences in the method of emptying the kidneys. Pyeloscopy is not a substitute for pyelography but an adjunct to it.

A. Lemberg, of Charkow, reported that he had found pyeloscopy of definite value as showing the functional variations in the urinary tract and aiding in the interpretation of the static conditions shown by serial radiogram. The findings indicate that lipiodol and iodopin, used as opaque media, do not injure the mucous membrane of the urinary tract. The fluoroscopic examination must be made with the patient in the vertical as well as the horizontal position. Pyeloscopy demonstrates the rhythmic contractions of the renal pelvis and the peristalsis of the ureter, also any peristaltic changes or abnormalities in the method of emptying of the renal pelvis. Under normal conditions, the emptying time of the renal pelvis and the ureter is six to twenty-four minutes, according to the position of the patient, the muscular tonus, and the character of the diuresis. Pyeloscopy is of special value in demonstrating motor insufficiency of the urinary tract of either primary or secondary origin.

G. Andrén, of Umeå, Sweden, described an improved technic for the pyelographic diagnosis of renal tuberculosis, whereby sharp definition

and richness of contrast in the pyelogram may be obtained to an unusual degree. In early renal tuberculosis he believes the characteristic feature of the pyelographic picture to be the presence of signs of infiltration of a calix wall and narrow fistulous tracts extending from this area.

PNEUMOPYELOGRAPHY

K. Neuwirt and J. Simon, of Brünn, Czechoslovakia, reported that up to March, 1928, they had used pneumopyelography in 320 cases without any untoward effects. They insufflate the renal pelvis with air slowly and carefully. They have found pneumopyelography of special value in the diagnosis of stones in the renal pelvis, as it demonstrates stones not visible in the usual radiogram and shows their number, form and position more exactly. It is also of great value in the diagnosis of tumors of the renal pelvis, especially small papillomas, and of ureteral stones. In complicated cases pneumopyelography is combined with pyelography with an opaque medium.

CANCER OF THE BREAST

F. Nahmmacher, of Dresden, recommended the following treatment for cancer of the breast: intensive x-ray irradiation of the entire breast, the axilla and the supraclavicular and infraclavicular region prior to operation; radical operation, including removal of the skin followed by Thiersch grafts. Nahmmacher believes that most recurrences in breast cancer originate in the skin stretched over the operative wound, and that, therefore, the skin must be sacrificed. Four weeks after operation, irradiation of the axilla and the supraclavicular and infraclavicular region with radium should be employed. In advanced cases with attachment of the tumor to the musculature and costal arch, the entire side of the thorax should be treated with radium in small fields. If radium is not available, the roentgen rays should be used postoperatively, but Nahmmacher is convinced that radium is preferable. This method is contraindicated in cases with cachexia and metastases.

F. Benard-Guedes, of Lisbon, reported that at the Portuguese Cancer Institute, in Lisbon, roentgen-ray treatment was used for the treatment of cancers of the breast which were anatomically operable but in which there was some other contraindication to operation. The method used was that of irradiating the breast tangentially, by cross-fixing, and irradiating the axillary and supraclavicular regions separately. Only thirty-three cases have been treated by this method, the first case in 1925 and the last in November, 1927, so that no conclusions as to end-results can be drawn. Of those treated, four have died from visceral metastases; the others show no signs of recurrence. Four have been apparently cured for three years. It has been found possible to obtain complete disappearance of the breast tumor by roentgen irradiation alone; also disappearance of glandular masses, if they are not too large.

ADNEXAL TUBERCULOSIS

P. Gilbert, of Paris, advocated radiotherapy for the treatment of tuberculosis of the uterine adnexa. Surgical treatment in these cases is difficult and is indicated only when the lesion is unilateral. Radiotherapy does not involve any immediate risk and does not cause the

formation of fistulas. It is suitable for extensive lesions. In the treatment of such cases, Gilbert believes that ovarian function should be completely suppressed. He uses penetrating or moderately penetrating roentgen rays, well filtered (0.5 mm. copper and 1 mm. aluminum); fractional doses, 500 R units per field once or twice a week; two fields below the umbilicus and, if there is evidence of peritoneal involvement, two others above the umbilicus; total dose, 3,500 to 5,000 R units per field. A second series of treatments should be given in two months if the result is not satisfactory. General light treatments should be used to build up the general condition.

TUMORS OF THE BLADDER

H. Young and C. A. Waters, of Baltimore, stated that suprapubic surgery is a failure for tumors of the bladder. They described an endovesical technic for the application of radium directly to bladder tumors. They use four types of cystoscopic radium applicators. Their present method is to treat bladder tumors with a combination of fulguration and endovesical cystoscopic application of radium and deep roentgenotherapy. Some remarkable cures were obtained in large malignant papillomas.

DYSTROPHIA ADIPOSEGENITALIS

R. Torres-Carreras and Cervera, of Barcelona, reported a case of dystrophia adiposogenitalis of Froehlich in a male patient, seventeen years of age, who was treated by roentgen rays. A total dosage of three and one-quarter erythema doses to the skin and 1.12 erythema dose over the pituitary region was given. This was sufficient to correct the gynandromorphism, cause the growth of pubic and axillary hair and the development of the external organs, and transform the character of the patient. Radiation was given with small fields and only one-quarter erythema dose at a sitting. Thirteen treatments were given in nine months.

EARLY OSTEOMALACIA

C. J. Gauss, of Würzburg, Bavaria, noted that he had observed a number of women with pain in the sacral region, increased by movement and interfering with walking, and tenderness on pressure over the inner pelvic wall, especially the spinal ischiadicæ and posterior wall of the symphysis. The symptoms suggested beginning osteomalacia; yet the roentgen-ray examination was negative for any definite pathologic changes in the bones. The suspicion of an ovarian endocrine disease was strengthened by the fact that some of the patients also showed adiposis dolorosa. Proper treatment for osteomalacia resulted in relief or definite improvement in symptoms. Proof that these cases represented incipient osteomalacia was furnished in one case, in which the patient was not treated and later examination showed roentgen-ray evidence of typical osteomalacia.

48 EAST SEVENTY-FOURTH STREET.

Selected Abstracts

Myoma

Castano, Carlos Alberto: An Etiologic and Pathogenic Study of Uterine Hemorrhages in Myoma and Hemorrhagic Uterine Affections. *La Presse Méd. Paris*, 33: 1299, Sept. 30, 1925.

The author has studied this question for eight years, and thinks he has found the solution. Some writers attribute these hemorrhages to endometritis, some to other alterations of the endometrium. Castano is of the opinion that these theories are incorrect, being based on an erroneous interpretation of the histologic picture presented by the endometrium in uteri removed at operation, which picture is really that of a persistence of the premenstrual stage of the endometrial cycle.

The experiments were carried out on guinea pigs in rut, exciting the uterine mucosa either by incising the organ or by introducing foreign bodies (e.g., glass balls) into its cavity (method of Leo Loeb.) In one group the corpora lutea were not disturbed, in another they were destroyed by the thermocautery. In the first group artificial deciduomas (true placentomas) were formed at the incised points, with characteristic histology. In transplanted portions of the uterus decidual reactions were also noted, showing that the stimulus is carried by the blood stream. In the second group the uterine mucosa remained indifferent to the irritative stimuli, and no decidual reaction was manifested.

The author concludes that the corpus luteum is responsible for the uterine menstrual cycle, and that the hemorrhages observed in cases of fibroma and of metropathic conditions are due to hormonal alterations emanating from the corpus luteum, which bring about a state of permanence of the premenstrual stage of the menstrual cycle. Fibrous nodules (e.g., submucous fibroids) act as local irritants and excite the ovaries, causing a persistence of the lutein cells in the atretic follicles, which in turn produce the characteristic endometrial change above mentioned. Thus the hemorrhages under discussion are due to the ovary, and not to an endometritis or other local endometrial alteration.

E. L. KING.

Masson, James C.: Parasitic Fibromyomata. *Surg. Gynec. Obst.* 43: 645, 1926.

True parasitic fibromyomas are very rare and difficult to diagnose. Six cases are reviewed. A parasitic fibromyoma should be removed because it may interfere with the function of important organs and because malignant changes may develop. It may adhere to any of the lower abdominal or pelvic structures or some other part of the uterus itself, or the vaginal wall, and its removal may then become difficult.

WM. C. HENSKE.

Fullerton, William D.: Fibroid Tumors of the Vulva. *Surg. Gynec. Obst.* 40: 244, 1925.

Fibroid tumors of the vulva are uncommon. Leonard found but six cases in 23,000 gynecologic admissions to the Johns Hopkins Hospital, and during the past twenty-five years in 12,000 patients on a similar service at Lakeside Hospital, Cleveland, only 2 cases were observed.

The tumors occur almost invariably during the childbearing period, although they do occur later and have been observed in infants. Virgins and parous women seem to be equally affected.

They are first seen as small, firm, rounded and smooth or slightly lobulated, painless subcutaneous masses. Pedunculation is common, particularly in the larger tumors. Growth may be rapid, although it is more often slow. Degeneration and malignant transformations are more common in these tumors in this location than in similar tumors elsewhere in the body, probably because of their variable blood supply, pedunculation and position, which makes trauma more or less unavoidable. They originate in the connective tissue and may start anywhere in the vulvar structures or in the extraperitoneal portion of the round ligament or internal genitalia, and as they increase in size, they are forced into the line of least resistance down the inguinal canal or vagina and appear at the vulva.

The case here reported concerns a married, multiparous negress, twenty-four years old, who was admitted to Lakeside Hospital complaining of irregular vaginal bleeding for the past four years.

About four years ago she noticed a slight swelling just above the external urethral orifice. This had greatly increased in size. Since she first noticed the tumor, she has had irregular vaginal bleeding, never profuse. Since her marriage, one year ago, she has had moderate leucorrhea and some slight discomfort on voiding. For the past year she has had backache and more or less constant, though not severe, pain in her lower abdomen.

Immediately beneath the normal clitoris a rather soft tumor mass completely filled the vestibule and bulged forward depressing the urethra backward and downward into the vagina so that the external meatus was almost invisible. The mass was about 3 cm. in diameter, circular in outline, and extended well up under the lower edge of the symphysis. Gonococci were found in the pus expressed from the urethra. The uterine fundus was normal in size, retroflexed and adherent in the pelvis. The tubes were thickened and adherent. The left ovary was cystic, 6 to 8 cm. in diameter, and adherent. Wassermann negative.

First operation: A vertical incision was made from clitoris to meatus, tumor shelled out, some difficulty being experienced in freeing it up under the symphysis. Cavity and mucosa were closed with chromic catgut. Tumor proved to be a cellular fibroma.

Three days later, as the patient was doing nicely, a laparotomy was done and a chronic pelvic peritonitis revealed. Both tubes and left ovary as well as a badly adherent appendix were removed and the uterus suspended. Patient made an uneventful recovery.

WM. C. HENSKE.

Meyer, J.: A Case of Fibromyoma of the Tube. *Finska Läkarsällskapets Handlingar.* 59: 43, 1927.

Myomas of the tubes are very rare, there having been only 39 observations recorded in literature. This patient, forty years old, noticed a mass in right lower abdomen, which occasionally caused some pain. In operation a fibromatous uterus was removed to which was attached a right tube, 12 cm. long, which contained a hard, nodular fibroid, the size of a fist.

AUTHOR'S ABSTRACT.

Shaw, W. Fletcher: Uterine Fibroids After the Menopause. *Brit. M. J.* 2: 919, 1927.

Shaw reports 65 cases of uterine fibroids after the menopause. He emphasizes the incidence of malignant disease and states that a uterus which contains

fibroids is much more likely to undergo malignant changes than one which is free from these tumors.

The writer analyzed the cases as to signs and symptoms and feels that it is much safer for a woman with fibroids of moderate large size to have the uterus removed before the menopause than run the risk of malignant or degenerative changes which so frequently appear after the menopause.

PROSHEK.

Seed, Lindon: Degeneration of Fibromyomata of the Uterus. Surg. Gynec. Obst. 41: 333, 1925.

Gross degeneration occurs in approximately 13 per cent of fibromyomas. Two hundred specimens of grossly degenerated fibromyomas of the uterus were reviewed and the degeneration classified as follows: hyaline, 24 cases; edematous, cystic, and myxomatous, 80; red degeneration with total necrosis, 33; calcification, 39; infected subserous and interstitial, 3; submucous, 13; miscellaneous, thrombotic sinus, 5; tuberculous, 1; and fibrolipomatous, 12.

Edematous, cystic, and myxomatous degeneration are a part of the same pathologic process, probably due to a gradual diminution in the blood supply. There are no clinical symptoms peculiar to it.

Red degeneration is an aseptic necrobiosis characterized by fatty degeneration, thrombosis of the vessels, extravasation of red blood cells and blood pigment. Pathologically it is a "red infection," and can be explained by a sudden complete vascular obstruction affecting chiefly the venous system. The end-result is a total fatty necrosis with transformation of the hemosiderin into hematoidin, and subsequent calcification. The occurrence of symptoms depends upon the size of the tumor and the acuteness of the necrosis. There is local pain and tenderness, and a mild toxemia.

Infection following necrosis of a submucous fibromyoma is very distinctive and probably accounts in itself for all symptoms.

Calcification, which occurs in two forms, the peripheral deposition in a totally necrotic fibromyoma, and the bone-like formation scattered throughout the tumor, has little clinical significance.

There is little evidence that the degeneration of fibromyomas produces a toxic effect on the other organs.

WM. C. HENSKE.

Schockaert: Degenerating Fibroid in a Woman Seventy-Nine Years of Age. *Bruxelles-méd.* 7: 959, 1927.

Schockaert reports a case of degenerating fibroid tumors of the uterus. The patient was seventy-nine years old. Until four weeks before operation when there appeared a copious sero-sanguinous discharge, the tumor had given rise to no trouble other than mild pressure symptoms. A supra-vaginal hysterectomy was performed under spinal anesthesia. The convalescence was normal and rapid. In concluding, the author calls attention to the necessity of observing carefully fibroid tumors which are giving rise to no trouble, because of the possibility of degeneration. Such observations should be continued, even after the menopause.

THEODORE W. ADAMS.

Nisot: Suppurating Fibroids. *Bruxelles-méd.* 7: 593, 1927.

The author reports two cases of infected fibroid tumors of the uterus. The first case illustrates the danger of operating on these cases too early, especially where the infection has spread to the surrounding organs. In this instance the

patient died on the second postoperative day. On the other hand, the second case points out the dangers of extreme conservatism where the infected nodule is intramural and limited to the uterus. In this latter type of case Nisot feels that hysterectomy is the procedure of choice. In the former instance the virulence of the infection should just be attenuated by rest in bed and ice caps to the lower abdomen. The use of autogenous vaccines may also be of aid. If it is felt that drainage can be established by vaginal puncture, this procedure should be carried out.

THEODORE W. ADAMS.

Patel and Denis: Necrobiosis of Uterine Fibroids. *Gynéc. et Obst.* 17: 11, 1928.

The condition consists in an aseptic necrosis following nutritional disturbance of the fibroma. Its relative rarity explains the prevalent uncertainty regarding its evolution and its relation to suppuration and gangrene. It is frequent in pedunculated fibroids, but not due to torsion, which condition is generally associated with gangrene and infection. In its true aseptic form, it occurs most commonly in subperitoneal and interstitial fibroids. The usual age is from thirty to fifty, and the condition frequently accompanies pregnancy. The causative ischemic factor has been attributed to strangulation of the tumor by its capsule, thrombosis of capsular veins, or to a special type of circulation characterized by a central terminal artery. The point of election is approximately the center of the tumor. The so-called "red fibroid" is considered to be an acute type of the same condition. The important characteristic is the complete absence of infection as a primary factor. The process may proceed to calcification with little clinical manifestation, or may show practically no change over a protracted period. In either case the clinical picture is often that of some general debilitating condition without local manifestation. On the other hand, the cavity may rupture into the fundus with secondary infection and a suggestive discharge; or secondary infection may occur without rupture. In this event the process assumes the character of a definite focus of infection, but will manifest itself less readily according to its situation in the uterine wall. Rupture of an infected cavity into the fundus is apt to cause amelioration of the symptoms. The diagnosis is difficult but the more or less definite appearance of pain and tenderness and softening in the region of a known uterine fibroid together with slight fever, malaise, etc., is suggestive. Vague general symptoms in the presence of known fibroids should suggest such a possibility even in the absence of local findings. In connection with pregnancy, complications following delivery, or abortion in the presence of fibromas, may be due to infection of a necrotic cavity.

The prognosis is relatively good, infection being infrequent. Treatment is essentially surgical. Subtotal hysterectomy or occasionally myomectomy is indicated. In pregnancy, artificial termination is not indicated, short of serious signs. At term cesarean section followed by hysterectomy or occasionally myomectomy should be the rule.

GOODRICH C. SCHAUFFLER.

Frankl, O.: Inflammatory Changes in Myomata. *Monatschr. f. Geburtsh. u. Gynäk.* 76: 27, 1927.

Inflammatory changes frequently occur in myomas especially in submucous ones. Less frequently are subserous myomas infected, usually from the intestines or adherent inflamed adnexa. Interstitial fibroids are very rarely infected and the author reports two such cases from a series of 2000 specimens of interstitial fibroids.

The first specimen was from a twenty-eight year old woman who was about eight weeks pregnant at the time of operation. Cultures from the degenerated myoma showed nonhemolytic streptococci but no organisms were found in the tubes, endometrium or peritoneum. The infection in the fibroid was most likely a hematogenous one from the patient's throat for she had had angina a few weeks before the operation.

The second specimen was obtained from a fifty-two year old woman. No bacteriologic studies were made in this case but a hematogenous infection is assumed for this one also. Neither of the two patients had any fever before operation.

J. P. GREENHILL.

Ulesco-Stroganowa, K.: A Case of Multiple Myomata With Malignant Degeneration in Several Nodules. Arch. f. Gynäk. 131: 34, 1928.

This tumor, removed from a fifty-nine year old patient, was peculiar in that there were present many nodules made up of completely differentiated muscle fibers intermingled with many nodules made up of cells similar in structure to the type of cells found in spindle cell sarcomas. There were also many nodules found in which the cells represented various gradations of development and structures between these two extremes. Apparently the developmental differentiation of the muscle cells of this tumor was interrupted at different stages from the early embryonic stages to the mature stage.

RALPH A. REIS.

Imhäuser, K.: Frequency and Valuation of Myosarcoma of the Uterus. Arch. f. Gynäk. 123: 12, 1924.

Since the advent and perfection of roentgen-ray therapy in the treatment of myomas, this method has supplanted all other methods in many clinics. This type of therapy is based on the assumption that retrogression of the tumors follows roentgen destruction of ovarian function. Sarcoma of the uterus must, therefore, be a contraindication to the use of the roentgen ray since the dose used to destroy ovarian function would have a stimulating effect rather than a destructive effect upon an actively growing sarcoma. In the Giessen clinic between 1918 and 1923, there were 208 cases operated upon for myomas, and among them were 11 diagnosed microscopically as sarcoma.

The symptomatology of sarcoma is very indefinite, only 6 had bleeding during the menopause, 5 had lost weight and several had had pain. Of 11 cases previously treated by roentgen therapy, and subsequently operated upon because the symptoms had not subsided, 2 had sarcomas. The myosarcomas all felt soft and often resembled pregnancy. Rapid growth of a tumor is suspicious and one quarter of all cases operated upon for a rapidly growing tumor proved to be sarcoma.

The author concludes from his studies that a differential diagnosis between sarcoma and myoma cannot be made clinically and that 6 per cent of myomas operated upon proved to be sarcoma. He recommends, therefore, that all myomas be given a full sarcoma dose of roentgen ray, rather than a dosage which would only destroy ovarian function. Only by this method can myomas be safely treated by roentgen therapy.

RALPH A. REIS.

Deaver, J. B., and Reimann, S. P.: Treatment of Uterine Fibroids; With Remarks on Pathology of Fibroids. Ann. Surg. 82: 486, 1925.

Should all fibroids producing symptoms be removed in the absence of grave constitutional contraindications or grave local disease not produced by the fibroid

itself? His reply to this is decidedly in the affirmative. He has never considered the fibroid a simple tumor, nor even in the absence of symptoms is it harmless. Many of these tumors elaborate toxins which cause degenerative changes in the heart and other organs. This fact of itself is sufficient reason for removing the tumor.

How should the fibroid be treated, by surgery, radiation, or perhaps both? In the author's opinion, the removal by operation is the safest procedure unless there are grave contraindications to operation. His objections to the use of x-ray and radium are: (1) The length of time necessary to accomplish a cure, (2) The risk of destroying the function of the ovaries, (3) The toxicity caused by radium and x-ray, (4) The deformity of the skin, (5) Furthermore, the pathologic tissue which remains behind, the future of which cannot be definitely forecast, (6) The blood does not return to normal as promptly as after operation. On the other hand, he considers in favor of operation (1) the low mortality of 2.1 per cent in 502 cases, (2) the ovaries if not diseased can be left, and (3) the woman has nothing to dread in the shape of degenerative changes in a questionable residuum. He has found that fibroids do not decrease in size after the menopause but usually do the opposite.

Whether a total, subtotal, partial hysterectomy or a myomectomy is to be done depends upon the size and location of the fibroid and the complications present. Myomectomy is especially indicated in young women, in single isolated fibroids, and in pedunculated fibroids. Contraindications to this operation are multiple tumors, extreme anemia, inflammatory diseases of the uterine appendages, multiple and large interstitial tumors. The type of hysterectomy depends upon the age of the patient, the condition of the cervix and of the uterus, the size and site of the tumor, its topography, and the complications present in the shape of diseased adnexa, and entanglements with neighboring organs. For fibroids developing during or after the menopause, particularly when the condition of the cervix is questionable and there is reason to suspect commencing degenerative changes in the uterus, total or complete abdominal hysterectomy is the operation of choice.

ADAIR AND ARMSTRONG.

Aschner, B.: The Advantages of Conservative Operations for Myomata Over Radical Operations or Roentgen Castration. *Wien. klin. Wchnschr.* 38: 699, 1925.

The author asserts that radical operations and roentgen castration should be replaced by the more conservative myomectomy because of bad effects following radical methods. During the past five years he has carefully followed 104 cases treated by supravaginal hysterectomy, by total hysterectomy with or without removal of the ovaries, and by radium or x-ray radiation and found among them not only the usual complaints and ailments resulting therefrom, but also cases of hypertension, cardiac dilatation, vessel spasms, myocardial degeneration, palpitation, painful carotid pulsation, gouty diatheses and subcutaneous hemorrhages as well as gastric, pulmonary, submucous and ocular hemorrhages. He also found Meniere's disease, all types of neuroses, nerve diseases, facial palsies, psychoses, glaucomas, and certain diseases of the skin following the radical methods of treatment. He, therefore, is emphatic in the belief that even though close to the menopause, the future condition of the patient should be considered more than at present and, except in the presence of malignancy or tuberculosis, the menstrual function should be preserved as long as possible. The operation of choice therefore is myomectomy.

The author has repeatedly proved that many cases of hemorrhagic metropathies may be successfully treated by medical means such as regulation of

the gastrointestinal tract, by hydrotherapy and by venesection. Styptics applied to the uterine mucosa and curettage are also highly effective. Conservative and medical treatment should always be especially directed toward the etiologic factors such as pelvic congestion, obstipation, plethora, dyscrasia, metabolic disorders, autointoxication. The conservative operative procedures employed by the author are curettage and fundal resection.

While the tendency toward more conservatism in the operative treatment of myomas is spreading, the profession is still far from attaining the dictum of Martin "that every myoma should be removed without disturbing the menstrual function." Small myomas, if not increasing rapidly, as well as those which do not produce symptoms, had best be treated expectantly. Those which produce symptoms or are growing rapidly should be removed by an intracapsular enucleation even though large in size or multiple. The author has had 65 cases during the past six years and has been able to conserve the menstrual function in all of them thus assuring a normal menopause with freedom from serious complications. The author does not hold to the common belief that conservation of the ovaries suffices. He always uses the abdominal route wherever possible because of the better opportunity for accurate resection, control of hemorrhage and accurate peritonealization.

RALPH A. REIS.

Giuseppe, P. L.: *The Treatment of Uterine Fibroids by Myomectomy.* Brit. M. J. 2: 1220, 1925.

It should be an axiom for every surgical intervention that an innocent tumor should be removed but the organ which contains it preserved, unless the removal of the tumor alone is a more dangerous operation, or the organ that is left is useless. Myomectomy must from its very nature be a higher ideal than hysterectomy, whether total or partial.

The indications for myomectomy are: (1) The fact that the woman is of childbearing age. (2) All pedunculated and single tumors should be removed and the uterus left. (3) There are cases in which hysterectomy would otherwise be indicated, but in which there are so many adhesions between the womb and other organs that myomectomy is the easier and safer operation. (4) Some patients object to the loss of the uterus.

The contraindications are as follows: (1) If the patient is above childbearing age; (2) Neither the number nor the position of the tumors should debar us from performing myomectomy; (3) Coexisting disease of the ovaries and tubes; (4) If malignant or septic degenerations are present.

Myomectomy is indicated during pregnancy under the following conditions: (1) When preexisting tumors grow rapidly; (2) when acute pain is produced by red degeneration; (3) when pressure symptoms make life a burden; (4) when the position of the tumor makes it almost certain that it will produce obstruction during labor.

F. L. ADAIR.

Goinard, E., and Goinard P.: *Myomectomies.* Rev. franç. de gynéc. et d'obst. 23: 353, 1928.

Myomectomy is the most conservative treatment of fibroids and should frequently be practiced. Intrauterine exploration will sometimes reveal that an apparently interstitial fibroid is in reality a submucous one and may be extirpated vaginally. Laparotomy and especially exploratory abdominal hysterotomy will indicate the advisability of simple myomectomy in many cases. Youth and desire for children should make the surgeon favor myomectomy provided this operation does not entail any risk. In each case the dangers of myomectomy

must be compared with those of hysterectomy but preliminary dilatation of the cervix, exact suturing, and tamponade lessen the hazard of myomectomy.

J. P. GREENHILL.

Ott, von, D.: Supravaginal Amputation of the Myomatous Uterus or Total Extirpation. *Monatschr. f. Geburtsh. u. Gynäk.* 78: 108, 1928.

Panhysteromyomectomy is the operation of choice for a fibroid uterus. During the last few years Ott has had absolutely no mortality. He believes that the cervix alone serves no purpose for it does not help support the vagina. The author has never had a case of prolapse of the vagina after total extirpation. In some instances unless the cervix is removed the operation is useless. This is true when there is gangrene of the tumors and when carcinoma is present in the cervix. Not infrequently when the cervix is left behind, small myomatous nodules are in the cervical stump and these may grow sufficiently to necessitate subsequent removal of the cervix. According to the author there are more complications after supravaginal hysterectomy than after panhysterectomy. He prefers the vaginal to the abdominal operation and even large fibroids may be removed by morcellation.

J. P. GREENHILL.

Essen-Möller, Elis: One Thousand Laparatomies for Myoma of Uterus. *Surg. Gynec. Obst.* 46: 187, 1928.

In one thousand of 2012 cases of myoma observed during a given period, operation was done, i.e., in about 48 per cent. The indications for operations were hemorrhage in, 494; pain in, 159; growth in, 119; mechanical factors in, 82; size of tumor in, 16; gangrene or infection in, 11; profuse discharge in, 12; cystic degeneration in, 16; torsion in, 4; suspected malignancy in, 16; simultaneous adnexal affection in, 40; faulty diagnosis in, 31 cases. The methods of operation were: Supravaginal amputation in, 799; total extirpation in, 117; enucleation in, 49; and extirpation of pedunculated myoma in, 35. In examination of the removed myoma there existed a myoma plus sarcoma in 18, myoma plus cancer of cervix in 2, myoma plus cancer of uterus in 5, myoma plus cancer in tubes in 1 case, and myoma plus cancer of ovaries in 3 cases. The conclusion reached with regard to the choice in method of operating is this: If in a patient, before, during, or after the menopause, a uterine tumor begins to change, to increase in size rapidly, to produce more abundant hemorrhage, and to be painful, and if the patient is losing flesh, then malignancy ought to be suspected and total extirpation should be done. As a matter of course, the degeneration may be of another kind, but even then the tumor ought to be removed and total extirpation is safer. Primary mortality was found to be due: To pulmonary embolism in, 13; infection in, 4; pneumonia in, 1; endocarditis and pleurisy in, 1; endocarditis and cephalitis in, 1; urine infiltration (lesion of the bladder first discovered at autopsy) in, 1; chronic anemia in, 1; miliary tuberculosis in, 1; suffocation (aspiration of vomited contents of stomach) in 1 case. Complications such as concurrent adnexal disease diagnosed before operation should be of great importance. Their nature in this series was as follows: Ovarian or para-ovarian tumor, 42 cases; malignant ovarian tumor, 3; hydrosalpinx, 3; pyosalpinx, 8; tuberculosis, 10; extrauterine pregnancy, 2; tubal cancer, 1 case. Intra-uterine application of radium to myoma in 103 cases gave the following results: Diminution in size of the tumor was noted in 60 cases, a favorable influence on hemorrhage in 87, but in 15 cases infection set in. For some reason or other 12 patients had to be operated upon later and 3 patients who were free from cancer before treatment were found to have it later. X-ray was used in 51 cases and it was observed that immediately or after renewed treatment hemorrhage had ceased in 6 per cent and that in 9.8 per cent operations later had to be done.

WM. C. HENSKE.

Miscellaneous

Spencer, Herbert R.: *The History of British Midwifery (1650-1800)*. Brit. M. J. 2: 853, 1927.

It may be said that during the one hundred and fifty years after Harvey published his *De Generatione Animalium* a great advance was made in the science and art of midwifery. This was chiefly due to the introduction of male practitioners, many of whom were men of learning and devoted to anatomy, the groundwork of obstetrics. The institution of lying-in hospitals by these male practitioners had an important influence in promoting teaching and research. The general introduction of the use of the forceps placed in their hands means, previously unknown, of delivering women, and by its results gradually overcame the opposition of the midwives, surgeons, and physicians to the new class of men-midwives. The action of the College of Physicians in instituting a special diploma of "Licentiate in Midwifery" was not without influence in improving the status of those practicing midwifery, although it ceased to be granted in the year 1800.

The characteristic of British midwifery at this period was conservatism. Although by some practitioners carried to excess, it led to laudable attempts, exclusively British, to avoid the operations of craniotomy which sacrificed the child, and of cesarean section and symphyseotomy which so often proved fatal to the mother.

The forceps were sometimes used unnecessarily then, as now; but the abuse of operative methods of delivery is much greater at the present time, and no better corrective of that abuse could be prescribed than a study of the careful records of the British obstetricians of the seventeenth and eighteenth centuries, showing the resources of that "perfect operatrix," Nature, in effecting delivery.

DR. PROSHEK.

Causes of Sickness Among Males and Females at Different Ages. United States Public Health Service. August 15, 1928.

That the human female is more often sick than the male, in spite of her longer average duration of life, is one of the apparent anomalies shown by available sickness records for adult persons and by mortality records.

The U. S. Public Health Service recently undertook to inquire a little more closely into this excess of the sickness rate among females. It was found that the higher female sickness rate did not hold true for children under ten years of age. Boy babies and small boys were apparently more subject to infectious diseases and to diseases of the eyes and ears, skin, to colds and other respiratory conditions, and to digestive troubles, than were girls of the same age. But as soon as the adolescent period of life began, the sickness rate of the girls became higher than that of boys and the female rate for practically all diseases was actually higher than that of the males throughout adult life. Women suffer more than men from sicknesses due to the common types of respiratory diseases, to digestive and nervous disorders, and to diseases and conditions of the kidneys and heart. This in spite of the fact that the death rate among older women is lower than that of older men.

Lhermitte, J., and Dupont, R.: *The Innervation of the Ovary*. Gynéc. et Obst. 15: 161, 1927.

The authors have made an exhaustive study of the innervation of the ovaries in the interest of destroying it for the purpose of gaining relief from ovarian distress. It was found that the best method of approach was through an inci-

sion parallel to the long axis of the ovary through the visceral peritoneum of the posterior fold of the broad ligament at the hilus of the ovary. Through this the vessels and nerves are easily exposed and all except arterial structures are ligated and cut.

The operation is very simple and in the hands of these operators has cured 10 out of 15 patients of complaints said to be of ovarian origin. Only 2 patients were apparently not relieved. They conclude that the destruction of its innervation does not harmfully affect the ovarian functions and that it obviously gives extremely interesting results in suppressing so-called ovarian pain.

GOODRICH C. SCHAUFFLER.

Ostendorf, L.: Blood Sedimentation. Its History, Its Theory, and Its Clinical Significance. *Monatschr. f. Geburtsh. u. Gynäk.* 77: 359, 1927.

The blood sedimentation time varies considerably even under physiologic conditions as shown by the following rates: umbilical cord blood, ten to twenty-four hours; male blood, six to nine hours; female blood, five to six hours; but during menstruation it is from one to two hours faster and during the latter months of pregnancy, during the puerperium and lactation the time varies between twenty and one hundred and twenty minutes. In the newborn under one month the time is seven hours and above one month it is one and a half hours. In pathologic conditions the most rapid rate is that in the presence of inflammation when it may sink to five or ten minutes.

The blood sedimentation test has found its greatest usefulness in the field of gynecology. The author used the test in 625 cases and found it useful in the following ways: (1) to determine the time to operate in cases of chronic inflammation of the adnexa; (2) to guide conservative treatment in cases of inflammatory adnexa, because when the sedimentation time rose, rest was necessary and when the sedimentation time fell, resorptive therapy was indicated; (3) to differentiate between inflammatory disease and tubal pregnancy; (4) to differentiate between appendicitis and salpingitis, for the sedimentation time in appendicitis does not fall for about thirty hours; (5) in cases of carcinoma it gives some information about the persistence of cure, because after operation or radiation the sedimentation time should gradually decrease and become normal at the end of a year.

J. P. GREENHILL.

Sakuma, H.: Experimental Study of the Excretory Functions of the Mucous Membrane of the Uterus. *Jap. J. Obst. & Gynec.* 10: 43, 1927.

The following results were obtained with regard to pigment excretion in the uterine mucosa. Out of twenty kinds of acid pigments and ten of basic pigments, only five pigments, i.e., trypan-blue, trypan-red, toluidin-blue, Congo-red, uranin, were found to be excreted by the uterine mucosa. Trypan-blue, toluidin-blue, trypan-red and Congo-red were quickly secreted, but when 1.0 gm. of a 2 per cent watery solution was injected into the vein of a rabbit weighing 100 gm., no excretion was recognized, which indicates the weakness of the function. When the smallest possible quantity of the pigments is used, trypan-blue is observed to commence its traceable passage one hour after injection of the pigment, toluidin-blue three hours after, trypan-red and Congo-red six hours after injection. The excretory function in the uterine mucosa is slow and comparatively long in duration. Those pigments that are not observed to be excreted within twenty-four hours after the injection are not excreted even after that time.

All the pigments which are excreted can stain the uterus in the living organism. Trypan-blue shows the most remarkable passage, as it has the strongest power of discoloration.

In the secretion of pigment in the uterine mucosa, the degree of diffusion of the pigments has nothing to do with the difficulty and speed of excretion.

Castration of the ovaries decreases the excretion of pigments by the uterine mucosa, while excitation of the ovarian function produced by ovarian preparations or by ovarian transplantation has no effect on the excretion. Pilocarpine has no marked influence on the excretion of pigments in the uterine mucosa, but atropine causes a decrease in the quantity of pigment excreted.

When adrenalin is injected repeatedly every thirty minutes, the concentration of the pigment secreted is lessened, but when one hour and a half have elapsed after the first injection of adrenalin, the excretion of pigment, on the contrary, is observed to show a sudden acceleration.

When Congo-red is injected, very minute granules of red pigment are observed to be scattered in the protoplasm.

On the fifth to sixth day of the puerperium, the excretion of pigment in the uterine mucosa is greater than that in the normal uterus, but only to a slight degree.

J. P. GREENHILL.

Sakuma, H.: Pathologic and Histologic Changes in the Uterine Mucosa Due to Various Kinds of Poisons. Jap. J. Obst. & Gynec. 10: 50, 1927.

Repeated subcutaneous or intravenous injections into rabbits of as small a quantity as possible of lead, mercury, silver, iron, arsenic, phosphorus, nicotine and chromium produce pathologic changes in the uterine mucosa. These changes are not due to the excretion of these substances in the uterine mucosa, and on the other hand the pathologic conditions are not the result of debility and exhaustion produced by these poisons. The author has proved that a small amount of iron is excreted by the endometrium, but not silver and chromium. He has no definite information concerning the other substances. Lead, nicotine, mercury, and phosphorus produce extensive degenerative changes in the ovaries but arsenic, silver, iron, and chromium have very little effect. The changes in the ovaries differ from those in the uterus because these chemical poisons have an elective action on different organs.

J. P. GREENHILL.

O'Keefe, C. D.: Relation of Hypothyroidism to Obstetrics and Gynecology. South. M. J. 20: 375, 1927.

There are five hypothyroid hazards in a woman's life: namely, puberty, pregnancy, menopause, operation, and infection. The patients present characteristic histories, physical findings, and metabolic changes so that the diagnosis is easy. The writer feels that infections, pregnancies, abortions, and miscarriages play an important rôle in the etiology of thyroid deficiency, the hypothyroidism in turn having a marked influence on pregnancy and sexual life in general. Severe menopausal disturbances are due to glandular deficiency in general and to thyroid in particular and not alone to ovarian death. Relief from these disturbing symptoms may be obtained through thyroid medication in practically all cases. The cure depends upon the duration of the disease

A. C. WILLIAMSON.

The Readers' Forum

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Readers of the Journal are urged to avail themselves of the facilities afforded by this department for replies to questions in the domain of obstetrics and gynecology. All inquiries should be directed to Dr. John O. Polak, 20 Livingston Street, Brooklyn, N. Y. Replies to such inquiries will be published as soon as possible in this department.

January 8, 1929.

Dr. Julius Levy of the Bureau of Child Hygiene, New Jersey State Department of Health, Trenton, N. J., writes us:

"We are carrying on a demonstration for prenatal care with a group of physicians. One of the routine measures we have asked them to carry out in the prenatal clinic is to take a vaginal and cervical smear to determine the presence of gonorrhea.

"They have objected to this procedure on the ground that there is no purpose in determining the presence of gonorrhea in a pregnant woman, as her condition makes it undesirable to institute treatment and that it is apt to lead to miscarriage."

Should smears from the vagina and cervix for gonococci be taken as part of the routine in prenatal examination, is a question which concerns everyone practicing obstetrics.

Occasionally a woman conceives, and contracts gonorrhea at her first coitus. More frequently, however, the woman becomes infected by her husband during the course of pregnancy. These make up the two classes of acute cases which are met with in prenatal clinic or antepartum practice. The clinical symptoms are so clear, and the discharge so profuse and characteristic that the diagnosis can easily be made, confirmed by smears taken from the urethra or vaginal entrance.

Treatment in these acute cases consists of rest in bed, postural drainage, vulva cleanliness, vaginal irrigations and the free exhibition of alkaline waters. After the acute stage has passed, the following local treatment may be employed without fear of abortion, after the vagina is irrigated with a weak permanganate solution. The patient should be placed in the knee-chest position and the vaginal walls and the portio exposed with the Sims speculum. These areas are then cleansed with pledgets of sterile cotton and the entire mucous surface of the portio, vagina, introitus, and meatus painted with a 10 per cent mercurochrome solution which is allowed to dry. Should cleansing douches be used, warm alkaline irrigation with a bag or can at low elevation accomplishes all that is needed.

Chronic gonorrheal lesions of the cervix cannot be cured during pregnancy, nor can the gonococcus be recovered by smears taken from the cervix of the pregnant woman in any large proportion of cases which have a history of neisserian infection. While we believe that chronic gonorrhea is extremely prevalent among the women attending hospital clinics, and that labor and the puerperal discharge are often sufficient to induce activity in these apparently dormant organisms, and that the presence of the gonococcus may also predispose by symbiosis to streptococcus infection during the puerperium, we are also reasonably certain, from our individual experience, and from a careful review of the literature, that gonococcus cannot be

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recovered by smears with sufficient frequency to justify the risk of disseminating infection beyond the sterile zone. If the cervical lesion is extensive the woman will be sterile, if not, and she becomes pregnant, the cocci are latent and do little harm in the puerperium in properly managed cases.

Finally: The child is safeguarded in the presence of neisserian infection whether treated or untreated by the instillation of a silver solution into the conjunctival sac. The omission of this precaution is costly, even in labors where no gonococci can be obtained by smear or culture. We believe, therefore, that the objection to this routine procedure is well founded, for why do something that gives neither information to the physician, nor protection to the patient?

Books Received

TRoubles FONctionELLES ET DYSTROPHIES EN GYNECOLOGIE. Par Paul Petit-Dutaillis, chirurgien de l'hôpital privé Saint-Michel. Avec 185 figures dans le texte. Paris, Gaston Doin & Cie, 1928.

HANDBUCH DER GESAMMTEN STRAHLENHEILKUNDE, BIOLOGIE, PATHOLOGIE UND THERAPIE. Herausgegeben von Professor Dr. Paul Lazarus in Berlin. In zwei Bänden. Zweiter Band, erste und zweite Lieferung. München, Verlag von J. F. Bergmann, 1928.

METHODS AND PROBLEMS OF MEDICAL EDUCATION. Tenth series. The Rockefeller Foundation, New York City, 1928.

Erratum

In the article by Jarcho entitled "Changes in the Leucocytes During Labor and the Puerperium," which appeared in the January, 1929, issue, in the second paragraph under Table I, on page 18, certain lines of type have been transposed. The paragraph should read:

Twenty-three cases of normal labor were studied with respect to the differential blood counts. Space does not permit of a detailed report of the results, but an average of the total figures is given in Table I.

